Overview of Trends in Canadian mineral exploration

CANADIAN INTERGOVERNMENTAL WORKING GROUP ON THE MINERAL INDUSTRY

2004

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Canadian Intergovernmental Working Group
on the Mineral Industry

2004

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The cover photo shows diamond-drilling activities at Commander Resources Ltd.'s Malrok zone on Baffin Island, Nunavut. The first-ever drill-testing of the 140-km-long Bravo iron formation was undertaken in 2004 by Suisse Diamond Drilling. Several interesting gold values, in channel samples, and a nickel-copper-cobalt occurrence, in a grab sample, have been discovered in the Bravo iron formation near the southern margin of the Proterozoic Piling Basin on Central Baffin Island. The Bravo iron formation is similar in age and tectonic setting to the large Homestake gold mine in South Dakota. Further exploration work targeting both gold and base metals is planned to start in the spring of 2005.

Preface

The *Overview of Trends in Canadian Mineral Exploration* report is prepared annually, on behalf of the Intergovernmental Working Group on the Mineral Industry (IGWG), for presentation to federal, provincial and territorial mines ministers. It contains an analysis of recent indicators of exploration and deposit appraisal activity in Canada, a review of the exploration and deposit appraisal sector of each province/territory, and a review of the worldwide activities of the larger Canadian exploration and mining companies. The information in this report is current as of November 2004.

The analyses, articles and reviews found in this report were prepared by officials from respective provincial/territorial departments responsible for mineral exploration and from Natural Resources Canada (NRCan). The Minerals and Metals Sector of NRCan was responsible for compiling, editing, producing and distributing this report, which covers exploration and deposit appraisal activities for metallic minerals, nonmetallic minerals, coal and uranium. It does not refer to petroleum-related work.

The report can be accessed on the Internet at www.nrcan.gc.ca/mms/pubs/explor_e.htm.

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Information Requests

For further information on specific issues related to this report (i.e., exploration activities, incentives and programs, rules and regulations, geoscientific data, etc.), the reader is invited to contact the appropriate federal, provincial or territorial authorities at the telephone numbers listed below or to consult their respective web sites. The contact information for officials who prepared the provincial/territorial sections is also provided at the beginning of each of these sections while the NRCan officials who participated in the preparation of this report are listed below. Prince Edward Island is not included because of a current lack of mineral exploration activity.

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Executive Summary

Statistics from the federal-provincial/territorial Survey of Mineral Exploration, Deposit Appraisal and Mine Complex Development Expenditures show that 2004 was a banner year for the Canadian mineral exploration sector.

After a severe downturn that brought spending levels to an historical low point in 2000 ($497 million), all-inclusive exploration and deposit appraisal expenditures started to recover slowly in 2001 ($513 million) and then gained momentum in 2002 ($573 million) and 2003 ($687 million). Revised company spending intentions for 2004 predict that exploration and deposit appraisal spending for that year will total $979 million. When converted to 2003 constant dollars, this total is the highest on record since 1997.

This remarkable and quite sudden upturn can be explained by the convergence of a number of positive factors. Rapidly rising metals prices, the availability of generous tax and non-tax incentives, and the willingness of investors to support mineral exploration ventures, as well as a steady stream of positive exploration news, all contributed to revitalizing mineral exploration in this country. The continued presence of these favourable conditions at the beginning of 2005 points to another good year for the Canadian mineral exploration sector.

The junior mining sector, which had been severely battered by the downward trend of the late 1990s, was mainly responsible for this intensification of exploration and deposit appraisal activity. In fact, junior spending was expected to reach $488 million in 2004, a total that would bring junior companies on par with senior companies whose spending was forecast to amount to $491 million.

As a result of this drastically increased junior company spending, expenditures dedicated solely to the exploration work phase are expected to reach $783 million in 2004, representing 80% of total intended exploration and deposit appraisal expenditures for that year. Furthermore, $719 million (92%) of this total will be incurred off mine sites, a clear indication that spending is concentrated on off-mine-property and grassroots types of work.

The current focus on the earlier stages of the mineral development cycle practically erases the concerns about the lack of grassroots-type exploration that were expressed just a few years ago. However, there is now evidence that Canada needs more advanced exploration and deposit appraisal work, as well as on-mine-site activities, to increase ore reserve levels and prolong the lives of certain Canadian mines and mining camps. This is particularly true of base-metal mining camps and the smelters and communities that depend on them.

In terms of spending by commodity group, data from 2003 reveal that precious metals continued to dominate the Canadian exploration scene as the top exploration target while the search for diamonds outpaced that for base metals for the third year in a row.

As detailed in the Regional Outlook section of this report, many interesting exploration and deposit appraisal projects are currently under way in Canada. Federal, provincial and territorial governments continue to support and promote exploration and deposit appraisal activities in their respective jurisdictions through various initiatives, including innovative fiscal incentives, the resolution of land access issues, and the provision of state-of-the-art geoscientific data.

Globally, Canada continues to be the foremost destination for the exploration capital of the world's larger mineral exploration companies. In 2003, some 18% of the mineral exploration programs planned by these companies were expected to be conducted in Canada. As for the larger Canadian companies, they were expected to undertake one third of all the exploration programs in the world in 2003, a share that is by far the largest of the global mineral exploration market.

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ABBREVIATIONS

The reader should note that a number of abbreviations for common units of measurement appear in the text:

cm	centimetres
ct	carats
ct/ht	carats per hundred tonnes
ct/t	carats per tonne
ct/y	carats per year
ft	feet
g	grams
g/t	grams per tonne
ha	hectares
kg	kilograms
km	kilometres
km2	square kilometres
lb	pounds
m	metres
Mct	million carats
Mha	million hectares
Mt	million tonnes
Mt/y	million tonnes per year
NTS	National Topograpnic System
oz	troy ounces
t	tonnes (metric)
t/d	tonnes per day
t/h	tonnes per hour
t/y	tonnes per year
tU	tonnes of uranium

Note: Unless specified otherwise, all dollar figures are in Canadian dollars.

1. Indicators of Mineral Exploration and Deposit Appraisal Activity in Canada

1.1 INTRODUCTION

The first chapter of this report presents data and analysis on indicators of mineral exploration and deposit appraisal activity in Canada. Except where needed for comparing different data sets, it does not cover activities beyond the deposit appraisal stage, such as those related to mine development. The most important of the indicators studied in this report is spending and, accordingly, most of the analysis focuses on expenditure trends and patterns. Chapter 1 also provides analysis on two other indicators of exploration and deposit appraisal activity: drilling and claim staking.

The federal-provincial/territorial Survey of Mineral Exploration, Deposit Appraisal and Mine Complex Development Expenditures was redesigned in 1997 to provide a more comprehensive breakdown of the mineral development cycle in Canada. This breakdown is based on the generalized model of the mineral resource development and mining process (**Table 27** in Appendix 2). The introduction of cost categories such as engineering, environment, feasibility studies and land access, and a clearer separation between the different work phases, offer expanded analytical options over the pre-1997 survey format. While the former survey data continue to be used to show historical trends, the analysis in this report is primarily based on the set of definitions[1] that was adopted in 1997. For a better understanding of the survey and its definitions, the reader is invited to consult Section 1.2 and Appendix 2.

A further change to the survey methodology was tested and adopted in 2002. The introduction of a revised survey of company spending intentions improved the accuracy of the initial survey of company spending intentions for a given year. The initial survey of company spending intentions is conducted in the last quarter of the previous year and compiled in January of the forecast year while the revised company spending intentions survey is conducted in the first half of the forecast year. The results of this "revised intentions survey" are released in August, seven months after the release of the original spending intentions forecast. All companies that had reported spending intentions during the first forecast compilation, as well as those that had failed to do so, are surveyed again on how close they are to their previously reported spending plans. This new feature improves the forecast capabilities of the entire survey process and provides more timely information on the actual state of mineral exploration for industry stakeholders and decision makers at the provincial/territorial and federal levels of government.

1.2 SUMMARY OF SURVEY DEFINITIONS

In the Survey of Mineral Exploration, Deposit Appraisal and Mine Complex Development Expenditures, often referred to as the federal-provincial/territorial survey of mining and exploration companies, exploration is defined as the work carried out on- or off-mine-site to search for, discover and carry out the first delineation of a previously unknown mineral deposit to establish its potential economic value (tonnage and grade) and to justify further work. Deposit appraisal, on the other hand, includes the work carried out on- or off-mine-site to bring a delineated deposit to the stage of detailed knowledge required for a production feasibility study.

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[1] A different set of definitions is used in Chapter 3, which contains data and analysis on worldwide exploration activity. This chapter is based on data from the Metals Economics Group.

The more detailed cost breakdown of the new survey format adopted in 1997 provides total exploration and deposit appraisal expenditures that are generally higher than the ones obtained from the traditional "field work and overhead" cost categories in the old survey simply because costs related to engineering, economic and feasibility studies, the environment, and land access were not previously accounted for. The survey also collects data on capital and repair costs for construction, machinery and equipment for each of the work phases (exploration, deposit appraisal and mine complex development), but these costs will seldom be referred to in this review. The comprehensive coverage offered by all these categories of expenditures provides a more complete picture of the total investment required to bring projects to the production decision stage.

1.3 EXPLORATION AND DEPOSIT APPRAISAL EXPENDITURES

Over the years, levels of exploration and deposit appraisal expenditures have been relied upon to determine the health of Canada's mineral exploration sector and to provide an insight into the future of the country's minerals and metals production capacity. This section focuses on analyzing expenditure data for 2003 and 2004.[2] The data for 2003 are considered to be final. The data for 2004 were compiled in January 2004 and revised in August 2004. They will be finalized in 2005. The section also provides some coverage of the eight-year period 1997-2004, which represents the first eight years of data for the redesigned survey. The analysis, figures and tables presented in this chapter are denominated in current Canadian dollars. However, in order to keep an inflation-free perspective, some of the longer-term comparisons that appear in this text will also be presented in terms of 2003 constant dollars.

1.3.1 2003 Exploration and Deposit Appraisal Expenditures

1.3.1.1 Statistical Summary

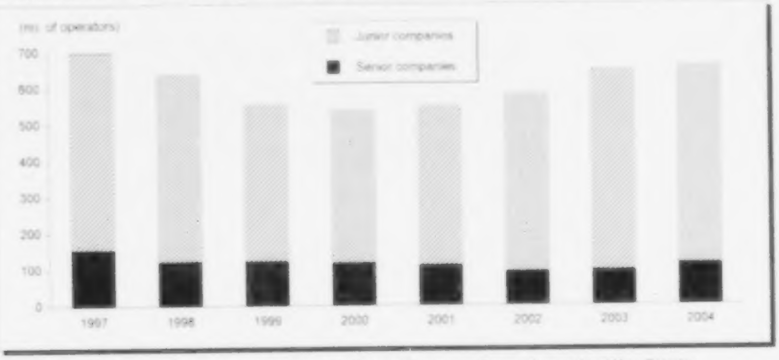
In 2003, 651 companies (project operators) and some prospectors spent $687 million on mineral exploration and deposit appraisal in Canada (**Figure 1** and **Table 1**). That number of companies represented a significant increase of 11% from the 2002 total of 586 companies (expenditures of $573 million) and a further increase from the low of 541 project operators that was reached in 2000. A total of 115 companies (compared to 89 in 2002) spent more than $1 million each in 2003; these companies' expenditures accounted for 84% of the total expenditures for that year. On an annual basis, projects with spending of $1 million or more have accounted for most of total expenditures (80% or more) since the 1997 survey redesign.

Compared to 2002, spending decreases totaling $44 million were recorded in five provinces/territories (**Figure 2** and **Table 2**). Newfoundland and Labrador (-$21 million) and the Northwest Territories (-$19 million) accounted for almost all of the combined decrease. Manitoba, Alberta and New Brunswick experienced minimal decreases in expenditures. In percentage terms, Newfoundland and Labrador saw its spending decrease by almost one half (48%) and the Northwest Territories by more than a quarter (26%). In Newfoundland and Labrador, this decrease may have been more

---

[2] For further analysis of 2003 exploration and deposit appraisal expenditures and a brief discussion of 2004 spending intentions, see Ginette Bouchard, "Mineral Exploration, Deposit Appraisal and Mine Complex Development Activity in Canada" in the 2003 edition of the *Canadian Minerals Yearbook*, Natural Resources Canada, Ottawa.

Figure 1
Project Operators Active in Exploration and Deposit Appraisal in Canada, 1997-2004 (Current Dollars)



Source: Natural Resources Canada, based on the Survey of Mineral Exploration, Deposit Appraisal and Mine Complex Development Expenditures.
Notes: Data include prospectors and prospector groups. Data up to and including 2003 are final; 2004 data are based on revised company spending intentions as compiled in August 2004.

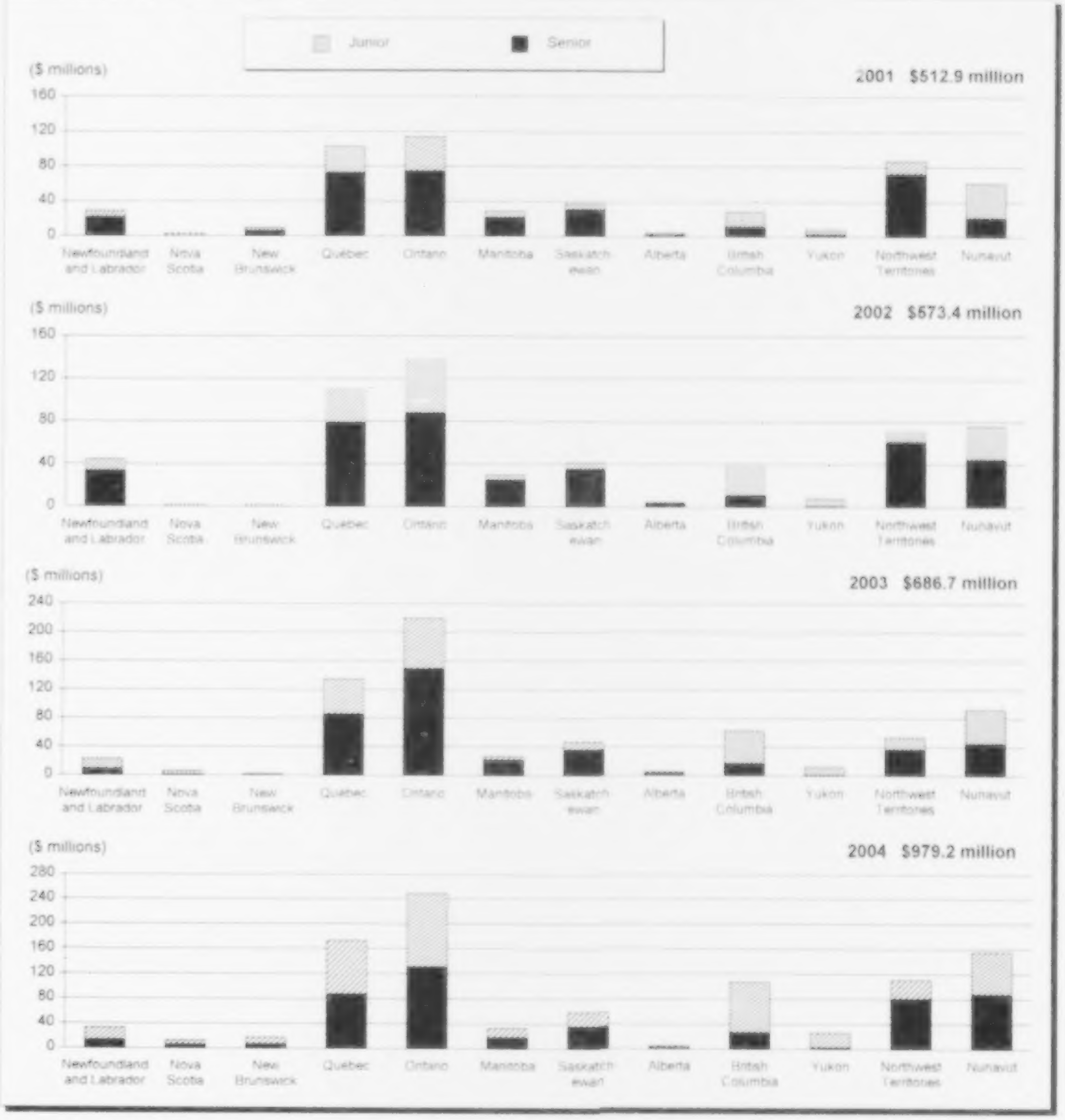
TABLE 1. EXPLORATION AND DEPOSIT APPRAISAL EXPENDITURES IN CANADA, (1) BY RANGE OF EXPENDITURES AND BY TYPE OF COMPANY, 2001-04 (Current Dollars)

	Junior			Senior			Total		
Range of Expenditures	Companies	Expenditures	Percentage of Total Expenditures	Companies	Expenditures	Percentage of Total Expenditures	Companies	Expenditures	Percentage of Total Expenditures
($)	(number)	($000)	(%)	(number)	($000)	(%)	(number)	($000)	(%)
2001									
>10 million	1	14 336	8.1	11	222 869	66.5	12	237 205	46.3
5 million-10 million	4	28 571	16.1	9	60 863	18.2	13	89 434	17.4
1 million-5 million	34	62 821	35.3	19	37 525	11.2	53	100 346	19.6
500 000-1 million	42	28 921	16.3	9	6 494	1.9	51	35 416	6.9
200 000-500 000	69	22 237	12.5	9	3 046	0.9	78	25 284	4.9
100 000-200 000	71	10 144	5.7	24	3 629	1.1	95	13 773	2.7
50 000-100 000	57	4 027	2.3	4	304	0.1	61	4 331	0.8
1-50 000	122	2 052	1.2	25	405	0.1	147	2 458	0.5
Subtotal	400	173 110	97.4	110	335 136	100.0	510	508 246	99.1
Prospectors (2)	43	4 623	2.6	–	–	–	43	4 623	0.9
Total 2001	443	177 733	100.0	110	335 136	100.0	553	512 869	100.0
2002									
>10 million	–	–	–	12	256 148	66.9	12	256 148	44.7
5 million-10 million	6	37 268	19.5	8	56 659	14.8	14	93 917	16.4
1 million-5 million	40	69 855	36.6	23	61 252	16.0	63	131 107	22.9
500 000-1 million	48	32 201	16.9	4	2 918	0.8	52	35 118	6.1
200 000-500 000	89	28 979	15.2	10	3 448	0.9	99	32 427	5.7
100 000-200 000	76	10 886	5.7	9	1 426	0.4	85	12 312	2.1
50 000-100 000	80	3 939	2.1	6	448	0.1	86	4 387	0.8
1-50 000	144	2 828	1.5	21	329	0.1	165	3 157	0.6
Subtotal	463	185 946	97.5	93	382 628	100.0	556	568 573	99.2
Prospectors (2)	30	4 847	2.5	–	–	–	30	4 847	0.8
Total 2002	493	190 793	100.0	93	382 628	100.0	586	573 421	100.0
2003									
>10 million	–	–	–	12	261 891	65.0	12	261 891	38.1
5 million-10 million	8	60 146	21.2	14	93 128	23.1	22	153 274	22.3
1 million-5 million	66	127 868	45.1	15	36 807	9.1	81	164 676	24.0
500 000-1 million	59	40 660	14.3	10	6 547	1.6	69	47 206	6.9
200 000-500 000	105	33 910	12.0	6	2 179	0.5	111	36 089	5.3
100 000-200 000	79	10 662	3.8	6	1 386	0.3	85	12 048	1.8
50 000-100 000	72	5 057	1.8	9	620	0.2	81	5 677	0.8
1-50 000	144	2 353	0.8	21	489	0.1	165	2 842	0.4
Subtotal	530	280 655	98.9	96	403 047	100.0	626	683 703	99.6
Prospectors (2)	25	3 032	1.1	–	–	–	25	3 032	0.4
Total 2003	555	283 686	100.0	96	403 047	100.0	651	686 735	100.0
2004 (rsi)									
>10 million	4	48 085	9.9	14	337 186	68.7	18	385 271	39.5
5 million-10 million	15	101 568	20.8	11	82 851	16.9	26	184 419	18.9
1 million-5 million	116	234 655	48.1	22	55 175	11.2	138	289 830	29.6
500 000-1 million	85	54 796	11.2	13	8 410	1.7	98	63 206	6.5
200 000-500 000	117	35 787	7.3	16	5 007	1.0	133	40 794	4.2
100 000-200 000	57	7 117	1.5	12	1 560	0.3	69	8 677	0.9
50 000-100 000	43	2 625	0.5	5	335	0.1	48	2 960	0.3
1-50 000	92	1 561	0.3	21	399	0.1	113	1 960	0.2
Subtotal	529	486 233	99.6	114	490 923	100.0	643	977 157	99.8
Prospectors (2)	18	2 073	0.4	–	–	–	18	2 073	0.2
Total 2004 (rsi)	547	488 306	100.0	114	490 923	100.0	661	979 229	100.0

Source: Natural Resources Canada, from a federal-provincial/territorial survey of mining and exploration companies.
– Nil; (rsi) Revised spending intentions.
(1) Includes on-mine-site plus off-mine-site activities. Includes field work, overhead, engineering, economic and pre- or production feasibility studies, environment and land access costs. (2) The number of prospectors is underestimated because it contains groups of prospectors.
Notes: Data up to and including 2003 are final; 2004 data are based on revised company spending intentions as compiled in August 2004.

Figure 2

Exploration and Deposit Appraisal Expenditures in Canada by Junior and Senior Companies, by Province and Territory, 2001-04 (Current Dollars)



Sources: Natural Resources Canada and Statistics Canada, based on the Survey of Mineral Exploration, Deposit Appraisal and Mine Complex Development Expenditures.

Notes: Exploration and deposit appraisal activities include only the search for and appraisal of new deposits; they do not include work for extensions of deposits already being mined or committed to production. Exploration and deposit appraisal expenditures include off-mine-site and on-mine-site costs incurred for field work and overhead, plus engineering, economic and feasibility studies, environment and land access costs. Data up to and including 2003 are final. 2004 data are revised company spending intentions as compiled in August 2004.

TABLE 2. EXPLORATION AND DEPOSIT APPRAISAL EXPENDITURES IN CANADA, BY PROVINCE AND TERRITORY, 2001-04 (Current Dollars)

Province/Territory	2001		2002		2003		2004 (rsi)	
	($000)	(%)	($000)	(%)	($000)	(%)	($000)	(%)
Newfoundland and Labrador	28 441.7	5.5	44 183.9	7.7	23 073.7	3.4	33 016.5	3.4
Nova Scotia	2 819.4	0.5	3 386.2	0.6	6 390.9	0.9	12 238.1	1.2
New Brunswick	9 459.2	1.8	3 206.3	0.6	2 552.1	0.4	17 385.2	1.8
Québec	102 946.7	20.1	111 207.7	19.4	134 042.9	19.5	173 416.4	17.7
Ontario	113 639.5	22.2	138 969.5	24.2	219 444.4	32.0	248 248.2	25.4
Manitoba	28 686.7	5.6	29 831.3	5.2	27 155.2	4.0	32 594.0	3.3
Saskatchewan	37 535.1	7.3	41 426.2	7.2	47 718.0	6.9	58 831.0	6.0
Alberta	4 452.9	0.9	5 603.2	1.0	4 907.0	0.7	3 997.9	0.4
British Columbia	29 137.1	5.7	39 225.3	6.8	62 517.6	9.1	107 334.0	11.0
Yukon	7 807.5	1.5	7 794.0	1.4	12 674.5	1.8	25 634.0	2.6
Northwest Territories	86 645.3	16.9	72 734.6	12.7	53 565.9	7.8	110 737.8	11.3
Nunavut	61 318.1	12.0	75 852.5	13.2	92 692.9	13.5	155 796.2	15.9
Total	512 869.2	100.0	573 420.6	100.0	686 735.0	100.0	979 229.3	100.0
Exploration	381 172.5	74.3	403 544.9	70.4	538 052.6	78.3	783 463.2	80.0
Deposit appraisal	131 696.6	25.7	169 875.7	29.6	148 682.4	21.7	195 766.1	20.0

Source: Natural Resources Canada, based on the Survey of Mineral Exploration, Deposit Appraisal and Mine Complex Development Expenditures.
(rsi) Revised spending intentions.
Notes: Data up to and including 2003 are final; 2004 data are based on revised spending intentions as compiled in August 2004. Exploration and deposit appraisal expenditures include off-mine-site and on-mine-site costs incurred for field work and overhead, plus engineering, economic and feasibility studies, environment and land access costs. Numbers may not add to totals due to rounding.

the result of spending being refocused from exploration and deposit appraisal to mine complex development (e.g., the Voisey's Bay nickel-copper-cobalt project) while, in the Northwest Territories, it was probably related to a temporary suspension of spending at the Snap Lake diamond project because of delays in obtaining the necessary permits.

Spending increases totaling $158 million were recorded in the seven remaining provinces/territories. Ontario experienced, by far, the largest increase with a gain of $80 million over 2002. British Columbia (+$23 million), Québec (+$23 million) and Nunavut (+$17 million) also registered significant increases in spending. In decreasing order of amounts spent on exploration and deposit appraisal, Ontario, Québec and Nunavut accounted for 65% of all such expenditures in Canada in 2003.

Expenditures for off-mine-site exploration and deposit appraisal activity increased by 22% (to $601 million) from the 2002 level of $493 million (**Figure 3**). Although this was the third consecutive increase in off-mine-site spending, the 2003 total was still 28% below the 1997 total (on a constant 2003 dollar basis). Overall, 88% of all exploration and deposit appraisal expenditures in 2003 was for off-mine-site activity. Ontario ranked first in terms of off-mine-site spending with 28% ($166 million) of the total for that category, followed by Québec with 19% ($115 million) and Nunavut with 15% ($93 million) (**Figure 4**).

On-mine-site exploration and deposit appraisal expenditures increased by 7% in 2003 (to $86 million) from the 2002 level of $80 million. However, in constant 2003 dollars, this amount represents only about 46% of the total of $187 million that was recorded in 1997. That on-mine-site exploration and deposit appraisal spending continues to plummet at a time when ore reserve levels are also on a declining trend (**Table 3**) highlights a lack of incentive to replace depleted ore reserves and points to a possible loss of some mining operations, especially on the base-metals side.[3]

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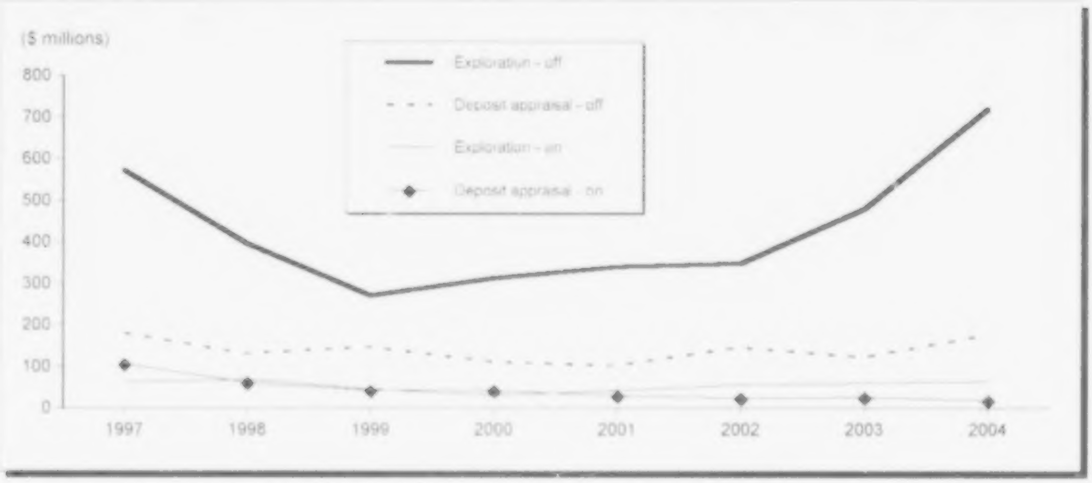
[3] For a discussion on the state of Canada's ore reserves, see Alan Reed, "Canadian Reserves of Selected Major Metals and Recent Production Decisions" in the 2003 edition of the *Canadian Minerals Yearbook*, Natural Resources Canada, Ottawa.

Figure 3
On-Mine-Site and Off-Mine-Site Exploration and Deposit Appraisal Expenditures (1) **in Canada, 1997-2004** (Current Dollars)



Source: Natural Resources Canada, from the Survey of Mineral Exploration, Deposit Appraisal and Mine Complex Development Expenditures.
(1) On-mine-site and off-mine-site exploration and deposit appraisal expenditures include field work and overhead costs, plus engineering, economic and feasibility studies, environment and land access costs.
Note: Data up to and including 2003 are final; 2004 data are revised company spending intentions as compiled in August 2004.

Ontario recorded the highest proportion of on-mine-site spending with 24% of total exploration and deposit appraisal expenditures while Manitoba (18%) and Québec (14%) ranked second and third. While these three provinces were also the national leaders in terms of on-mine-site spending in 2002, Ontario is the only one of the three that managed to record an increase in that type of spending in 2003. In percentage terms, this increase was almost on par with the increase that Ontario registered in the off-mine-site spending category. Two provinces, Ontario and Québec, accounted for $73 million (85%) of the Canadian total for on-mine-site exploration and deposit appraisal expenditures.

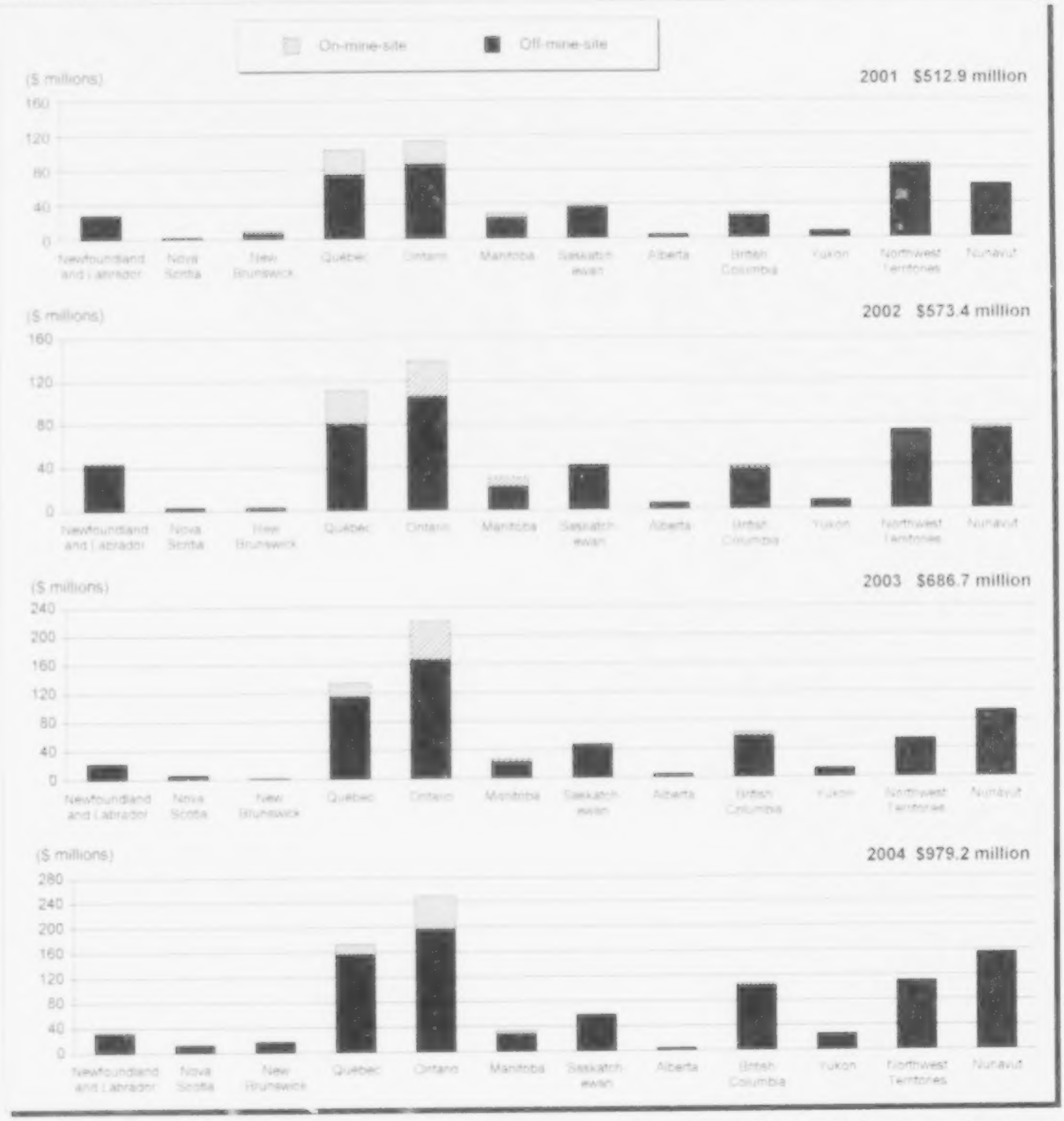
1.3.1.2 Spending by Work Phase

A breakdown of spending by work phase (exploration and deposit appraisal) shows that, in 2003, exploration expenditures amounted to $538 million (78% of total exploration and deposit appraisal spending) and deposit appraisal spending stood at $149 million (22% of total spending) (**Figure 5** and **Table 4**). In 2002, spending on the exploration phase had amounted to $404 million while a total of $170 million had been spent on deposit appraisal. Hence, exploration spending increased by 33% in 2003 and deposit appraisal spending declined by 12%. Since their low of 1999, exploration expenditures have clearly been trending upwards while the importance of deposit appraisal spending as part of total spending has been declining.

Off-mine-site spending of $478 million represented 89% of total spending in the exploration work phase in 2003 (**Figure 3**). Over the period 1997-2003, off-mine-site spending has consistently represented 85% to 90% of total exploration-phase expenditures. In terms of deposit appraisal expenditures, approximately 83% of the $149 million recorded for off- and on-mine-site deposit appraisal activities in 2003 was reported as off-mine-site spending. Off-mine-site deposit appraisal expenditures also accounted for more than 80% of total deposit appraisal expenditures in 2002.

Figure 4

On-Mine-Site and Off-Mine-Site Exploration and Deposit Appraisal Expenditures in Canada, by Province and Territory, 2001-04 (Current Dollars)



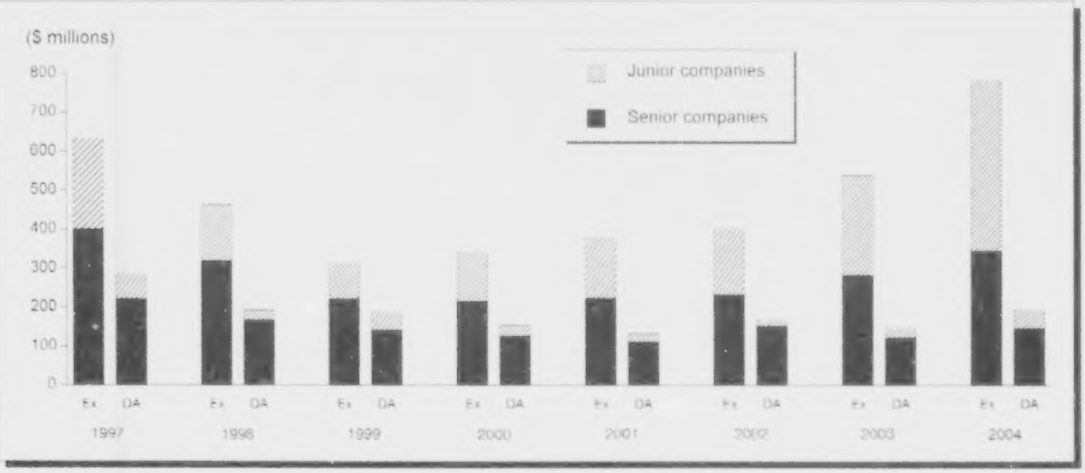
Source: Natural Resources Canada, based on the Survey of Mineral Exploration, Deposit Appraisal and Mine Complex Development Expenditures.
Notes: Exploration and deposit appraisal activities include only the search for and appraisal of new deposits; they do not include work for extensions of deposits already being mined or committed to production. Exploration and deposit appraisal expenditures include off-mine-site and on-mine-site costs incurred for field work and overhead, plus engineering, economic and feasibility studies, environment and land access costs. Data up to and including 2003 are final; 2004 data are revised company spending intentions as compiled in August 2004.

TABLE 3. CANADIAN RESERVES OF SELECTED MAJOR METALS AS AT DECEMBER 31 OF EACH YEAR. 1977-2002
Metal Contained in Proven and Probable Mineable Ore (1) in Operating Mines (2) and Deposits Committed to Production

Year	Copper	Nickel	Lead	Zinc	Molybdenum	Silver	Gold (3)
	(000 t)	(000 t)	(000 t)	(000 t)	(000 t)	(t)	(t)
1977	16 914	7 749	8 954	26 953	369	30 991	493
1978	16 184	7 843	8 930	26 721	464	30 995	505
1979	16 721	7 947	8 992	26 581	549	32 124	575
1980	16 714	8 348	9 637	27 742	551	33 804	826
1981	15 511	7 781	9 380	26 833	505	32 092	851
1982	16 889	7 546	9 139	26 216	469	31 204	833
1983	16 214	7 393	9 081	26 313	442	31 425	1 172
1984	15 530	7 191	9 180	26 000	361	30 757	1 208
1985	14 201	7 041	8 503	24 553	331	29 442	1 373
1986	12 918	6 780	7 599	22 936	312	25 914	1 507
1987	12 927	6 562	7 129	21 471	231	25 103	1 705
1988	12 485	6 286	6 811	20 710	208	26 122	1 801
1989	12 082	6 092	6 717	20 479	207	24 393	1 645
1990	11 261	5 776	5 643	17 847	198	20 102	1 542
1991	11 040	5 691	4 957	16 038	186	17 859	1 433
1992	10 755	5 605	4 328	14 584	163	15 974	1 345
1993	9 740	5 409	4 149	14 206	161	15 576	1 333
1994	9 533	5 334	3 861	14 514	148	19 146	1 513
1995	9 250	5 832	3 660	14 712	129	19 073	1 540
1996	9 667	5 623	3 450	13 660	144	18 911	1 724
1997	9 032	5 122	2 344	10 588	149	16 697	1 510
1998	8 402	5 683	1 845	10 159	121	15 738	1 415
1999	7 761	4 983	1 586	10 210	119	15 368	1 326
2000	7 419	4 782	1 315	8 876	97	13 919	1 142
2001	6 666	4 335	970	7 808	95	12 593	1 070
2002	6 774	4 920	872	6 871	82	11 230	1 023

Source: Natural Resources Canada, based on company reports and the Federal-Provincial/Territorial Survey of Mines and Concentrators.
(1) No allowance is made for losses in milling, smelting and refining. Excludes material classified as "possible." Includes "geological reserves" for some mines that do not report mineable ore. (2) Includes metal in mines where production has been suspended temporarily. (3) Excludes metal in placer deposits because reserves data are generally unavailable.
Note: One tonne (t) = 1.1023113 short tons = 32 150.746 troy oz.

Figure 5
Exploration and Deposit Appraisal Expenditures in Canada, by Type of Company and by Work Phase, 1997-2004 (Current Dollars)



Source: Natural Resources Canada, based on the Survey of Mineral Exploration, Deposit Appraisal and Mine Complex Development Expenditures.
Ex: Exploration; DA: Deposit appraisal.
Notes: Exploration and deposit appraisal expenditures include off-mine-site and on-mine-site field and overhead expenditures, plus engineering, economic and feasibility studies, environment and land access costs. Data up to and including 2003 are final; 2004 data are revised company spending intentions as compiled in August 2004.

TABLE 4. EXPLORATION, DEPOSIT APPRAISAL AND MINE COMPLEX DEVELOPMENT EXPENDITURES IN CANADA, (1) 2002 AND 2003

(Current Dollars)

Expenditure Category	Exploration		Deposit Appraisal		Exploration Plus Deposit Appraisal		Mine Complex Development		Grand Total	
	2002	2003	2002	2003	2002	2003	2002	2003	2002	2003
					($000)					
Field work and overhead (2)	392 105	523 460	105 121	90 691	497 226	614 151	726 026	679 495	1 223 251	1 293 646
Engineering, economic and pre- or production feasibility studies	4 874	10 641	48 739	39 770	53 612	50 411	11 172	23 656	64 784	74 067
Environment	4 731	2 678	15 052	15 104	19 783	17 782	73 796	73 483	93 579	91 265
Land access	1 836	1 274	964	3 117	2 800	4 391	51 891	10 077	54 691	14 468
Subtotal	403 545	538 053	169 876	148 682	573 421	686 735	862 885	786 711	1 436 305	1 473 445
Off-mine-site (3)	347 137	477 850	146 012	123 313	493 149	601 163	n.a.	n.a.	n.a.	n.a.
On-mine-site (3)	56 408	60 203	23 863	25 370	80 272	85 572	862 885	786 711	1 436 305	872 283
Capital (4)	10 283	5 545	21 101	16 719	31 383	22 265	1 260 130	1 015 268	1 291 513	1 037 532
$ for environmental protection and restoration (5)	–	513	–	269	–	782	56 124	34 305	56 124	35 087
Total	413 827	543 598	190 977	165 402	604 804	709 000	2 123 015	1 801 978	2 727 819	2 510 978
Repair and maintenance (4)	9 372	5 892	4 349	26 681	13 721	32 573	1 474 580	1 440 679	1 488 301	1 473 252
$ for environmental protection and restoration (5)	100	10	3	205	103	215	29 012	16 332	29 115	16 546
Grand total	423 200	549 490	195 326	192 083	618 525	741 573	3 597 594	3 242 657	4 216 120	3 984 230
Total environment	4 831	3 201	15 055	15 578	19 886	18 779	158 931	124 119	178 817	142 899
Environment as a percentage of grand total	1.1	0.6	7.7	8.1	3.2	2.5	4.4	3.8	4.2	3.6

Source: Natural Resources Canada, based on the Survey of Mineral Exploration, Deposit Appraisal and Mine Complex Development Expenditures.

– Nil; n.a. Not applicable.

(1) Includes on-mine-site plus off-mine-site activities; exploration and deposit appraisal activities include only the search for and appraisal of deposits and do not include work for extensions of known reserves. (2) Overhead expenditures include mineral leases and claims, and project-related head office expenditures. (3) Amount of exploration and deposit appraisal expenditures dedicated to off-mine-site and on-mine-site activities. (4) Includes construction, and machinery and equipment expenditures. (5) As part of capital expenditures or repair and maintenance expenditures.

Notes: Numbers may not add to totals due to rounding. Data for 2002 and 2003 are final.

A provincial/territorial breakdown of exploration and deposit appraisal expenditures reveals that virtually all recorded spending in 2003 in Manitoba, New Brunswick, the Yukon and Alberta was reported as exploration-phase work (**Figure 6**). Nunavut (87%), Ontario (79%), Newfoundland and Labrador (78%), Québec (77%) and British Columbia (77%) also recorded high proportions of exploration-related work. As was mentioned in the 2003 edition of this report, this continued emphasis on grassroots-type exploration highlights a lack of advanced projects undergoing development.

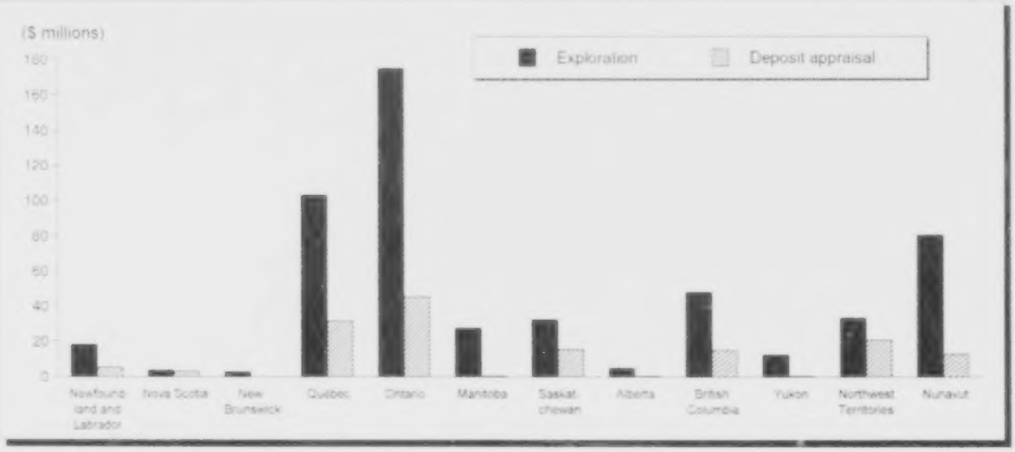
For another year, the advanced stage of some diamond projects in the Northwest Territories is reflected in the high proportion of deposit appraisal spending in that territory. In 2003, 39% ($21 million) of all exploration and deposit appraisal expenditures in the Northwest Territories was incurred for deposit appraisal activities. Although this percentage represents a decline from the 60% ($44 million) registered in 2002, the Northwest Territories, on a percentage basis, was only surpassed by Nova Scotia where almost half of the $6.4 million total spending was devoted to deposit appraisal activities. Most deposit appraisal activities in that province were focused on the gold potential of the Meguma Group in southern Nova Scotia. Saskatchewan was the other leader, in terms of percentage, with 33% ($15 million) of its expenditures falling in the deposit appraisal category. In this case, the deposit appraisal work was concentrated on Shore Gold's Star kimberlite and on uranium properties.

In terms of ranking by total exploration expenditures, Ontario was far ahead of the other provinces/territories with $174 million, compared to Québec's $103 million and Nunavut's $80 million. Ontario also came in first in terms of deposit appraisal spending with a total of $45 million, followed by Québec ($31 million) and the Northwest Territories ($21 million).

1.3.1.3 Spending by Type of Activity

A detailed cost breakdown for each of the exploration and deposit appraisal work phases shows that drilling (surface and underground) is the most important cost component in the discovery and delineation of a mineral deposit (**Figure 7**). In 2003, surface and underground drilling (diamond drilling and other types of drilling) accounted for 46% ($249 million) of the $538 million spent on the

Figure 6
Exploration and Deposit Appraisal Expenditures in Canada, by Province and Territory, 2003
(Current Dollars)

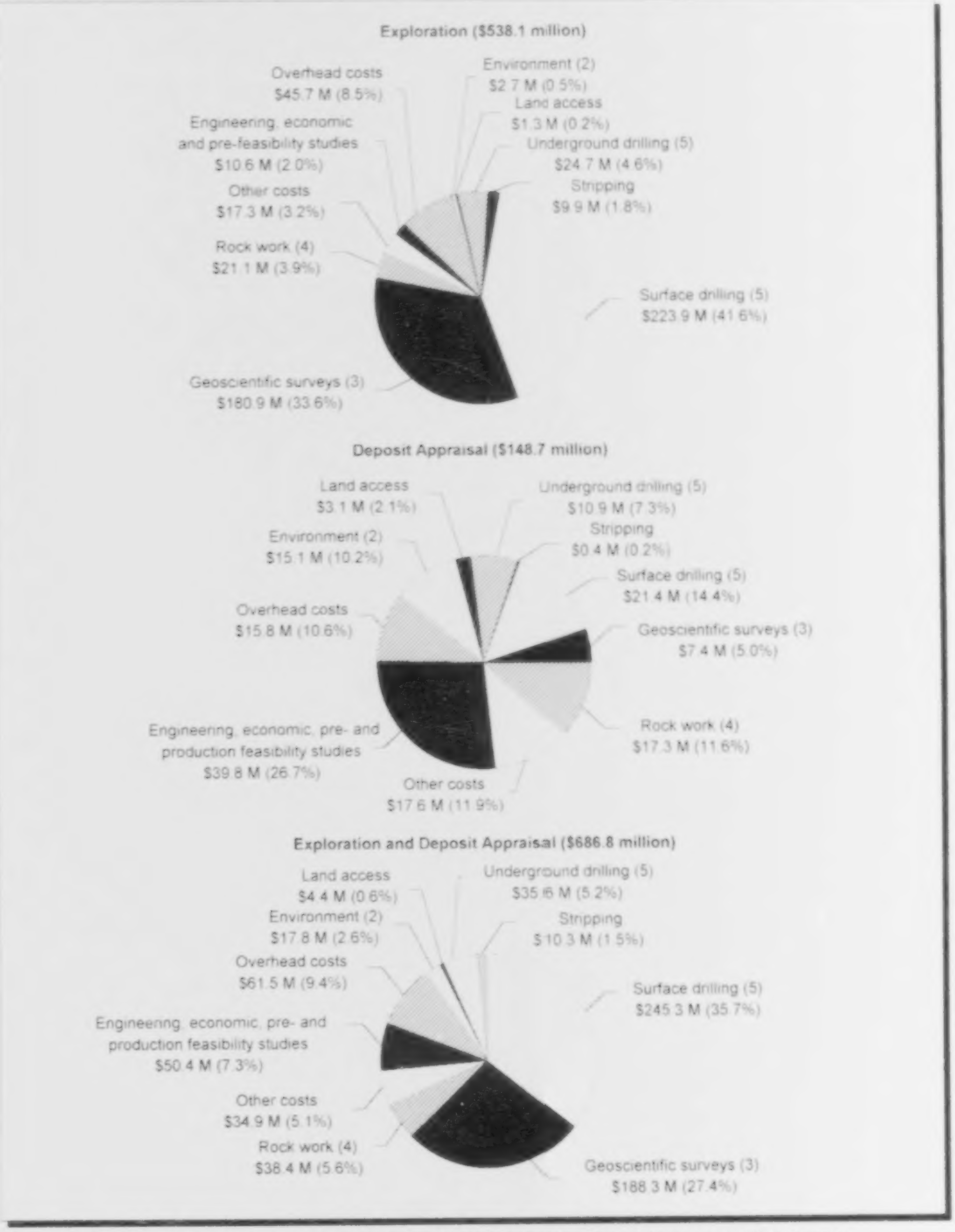


Source: Natural Resources Canada, based on the Survey of Mineral Exploration, Deposit Appraisal and Mine Complex Development Expenditures.

Notes: Exploration and deposit appraisal expenditures include off-mine-site and on-mine-site field and overhead expenditures, plus engineering, economic and feasibility studies, environment and land access costs. Data for 2003 are final.

Figure 7

Exploration and Deposit Appraisal Expenditures in Canada, (1) **by Type of Work, 2003** (Current Dollars)



Source: Natural Resources Canada, based on the Survey of Mineral Exploration, Deposit Appraisal and Mine Complex Development Expenditures.

(1) Includes on-mine-site and off-mine-site activities. (2) Environment includes characterization, permitting, protection, monitoring and restoration. (3) Geoscientific surveys include geology, geochemistry, ground geophysics and airborne geophysics. (4) Rock work activity includes shaft work, drifts, cross-cuts, raises, declines, rock sampling and dewatering costs. (5) Surface and underground drilling includes diamond and other types of drilling.

Notes: Numbers may not add to totals due to rounding. Data for 2003 are final.

exploration work phase. As can be expected, surface drilling represented the vast majority of exploration-related drilling activity. In fact, 90% of the $249 million spent on drilling was alloted to surface drilling projects. Evidently, geoscientific surveys (geology, geochemistry and geophysics) also represent a very important cost component in that work phase. In 2003, 34% ($181 million) of all exploration-phase spending was recorded under the geoscientific surveys cost category.

In the deposit appraisal phase, surface and underground drilling accounted for 22% ($32 million) of the total $149 million spent in 2003 while the preparation of engineering, economic and feasibility studies was second with 27% ($40 million).

Overall, surface and underground drilling accounted for 41% ($281 million) of all exploration and deposit appraisal spending in 2003 while geoscientific surveys ranked second with 27% ($188 million).

Among the other cost categories included in the Survey of Mineral Exploration, Deposit Appraisal and Mine Complex Development Expenditures, those of environment and land access can be of particular interest. For instance, these statistics may be useful for non-governmental organizations interested in monitoring mineral development activity, for mining stakeholders in presenting their case for improvements to the tax treatment of their industry, for Aboriginal communities in planning the use of their lands, and for governments in developing mining-related policies.

In 1997, a total of $47 million was recorded as environment-related expenditures (which include costs incurred for characterization, permitting, protection, monitoring and restoration), or 5.1% of all exploration and deposit appraisal expenditures for that year. This percentage remained almost the same in 1998 (4.9%) as a total of $32 million was directed at environment-related expenditures. It declined to 3.8% ($19 million) in 1999, 2.0% ($10 million) in 2000, and to only 1.6% ($8 million) in 2001. Environment-related expenditures rebounded in 2002 when they represented 3.5% ($20 million) of total expenditures. In 2003, $18 million, or 2.6% of total exploration and deposit appraisal expenditures for that year ($687 million), was spent on environment-related items (**Table 4**). As can be expected, most of that amount was invested in the deposit appraisal stage as environment-related expenditures tend to become more substantial as a project moves towards the mine construction stage. For example, when capital, repair and maintenance costs are excluded, environment-related costs represented the second highest cost category (albeit far behind the rock work category) in the mine complex development work phase in 2003. These costs amounted to $74 million, or 9.3% of the $787 million that was spent on the last work stage before actual mine production.

Similar to environmental costs, land access costs (which include costs incurred for impact and benefits and socio-economic agreements, rights of way, damages and permits) only account for a small fraction of total exploration and deposit appraisal expenditures. In recent years, these costs have typically ranged between about 0.5% and 1.5% of total exploration and deposit appraisal spending. In 2003, only $4.4 million was recorded as land access expenditures, an amount that represents 0.6% of total exploration and deposit appraisal spending. These same costs accounted for $10 million (1.3%) of mine complex development expenditures. Beyond that stage and into mine production, both environment and land access costs can increase substantially as items such as impact and benefits agreements, the adoption of more stringent effluents and emissions regulations, and the enviromental restoration of disturbed sites come into play.

Expenditures for economic, engineering and feasibility studies are more substantial than those for the environment and land access. In aggregate, these costs represented 5.2% ($48 million) of total exploration and deposit appraisal expenditures in 1997, 6.8% ($45 million) in 1998, 8.0% ($41 million) in 1999, 5.0% ($25 million) in 2000 and 5.6% ($29 million) in 2001. This type of spending almost doubled in 2002 when $54 million or 9.3% of total spending was dedicated to such studies and remained close to that level in 2003 with expenditures of $50 million (7.3% of the $687 million total). Once again, this type of expenditures was incurred more at the deposit appraisal stage.

1.3.1.4 Spending by Type of Company

The analyses within this report often distinguish between senior and junior companies. In general terms, a senior company derives its income from mining or other business ventures and can direct part of that income towards its exploration and deposit appraisal projects. Junior companies, on the other hand, usually have no regular source of income and must finance their projects through the issuance of shares.

In 2003, 96 senior project operators accounted for 59% ($403 million) of all exploration and deposit appraisal expenditures in Canada (**Figures 1** and **2**). About 70% of total senior spending was allocated to exploration activities with the remaining 30% going to deposit appraisal work (**Figure 5**). At 93, the number of senior project operators was slightly lower in 2002 but their proportion of total spending was higher. These 93 senior project operators reported 67% ($383 million) of total spending for that year. The distribution of senior project operators by range of spending did not change much between 2002 and 2003, except for an increase in the number of projects in the $5 million-$10 million range that appears to have come at the expense of the $1 million-$5 million interval (**Table 1**). While projects are not tracked on an individual basis in this analysis, this shift to higher spending per project is a likely indication of successful exploration and deposit appraisal work warranting further investment in 2003.

About 69% ($277 million) of the expenditures reported by senior firms in 2003 were incurred in Ontario, Québec and Nunavut (in decreasing order) (**Figure 2**). In Ontario, senior spending rose by 69% ($60 million). This increase was also accompanied by a significant increase in junior spending, providing that province with balanced growth in its exploration and deposit appraisal sector. The Northwest Territories and Newfoundland and Labrador both suffered setbacks of approximately $25 million in the senior spending category. However, as explained earlier, part of these decreases is likely due to the shifting of resources towards more advanced work rather than to a lack of interest by exploration and mining companies. New Brunswick, Nova Scotia and the Yukon reported virtually no senior spending in 2003.

The number of junior project operators jumped to 555 in 2003 from 493 in 2002, an increase of 13% (**Figure 1** and **Table 1**). Altogether, these junior companies and prospectors spent $284 million on exploration and deposit appraisal in 2003, almost 50% more than the $191 million they spent in 2002. This large increase follows increases in junior spending of 7% in 2002, 14% in 2001 and 10% in 2000. This rising trend in junior spending coincides with the introduction of federal and provincial/territorial incentives aimed at encouraging grassroots exploration and with improving metal market conditions.

In dollar terms, junior spending increased the most in Ontario (+$20 million), British Columbia (+$17 million), Québec (+$17 million) and Nunavut (+$17 million). Ontario recorded the largest amount of junior spending in 2003 with $71 million, followed by Québec ($49 million), Nunavut ($49 million) and British Columbia ($46 million) (**Figure 2**). These four jurisdictions accounted for 76% of all junior spending in Canada in 2003. Only New Brunswick and Alberta registered a decrease in junior expenditures, but these losses were minimal.

In 2003, junior company spending most frequently fell in the $200 000-$500 000 interval (**Table 1**). Companies spending less than $50 000 are not considered here as their average spending of less than $20 000 does not translate into many significant exploration projects. There were notable increases in the number of junior companies falling into the spending intervals situated between $200 000 and $5 million. In particular, the addition of 28 junior companies spending between $1 million and $10 million shows just how much importance this component of the Canadian mining industry has gained in recent years.

As for senior companies that did explore actively in 2003, they mainly undertook projects that cost between $500 000 and $10 million, with the different spending intervals in that range populated almost evenly. Senior companies spent $262 million (or 65% of their total expenditures) on 12 projects, a situation that closely resembled that of 2002. However, senior spending patterns differed in the $1 million-$5 million and $5 million-$10 million intervals where there was a definite shift in terms of the number of higher-cost projects.

1.3.1.5 Spending by Type of Commodity Sought

The survey provides a breakdown of exploration and deposit appraisal spending statistics by type of commodity sought. **Figure 8** shows such a breakdown for the groups of commodities or individual commodities most explored for in Canada: precious metals, base metals, diamonds, uranium and "others."

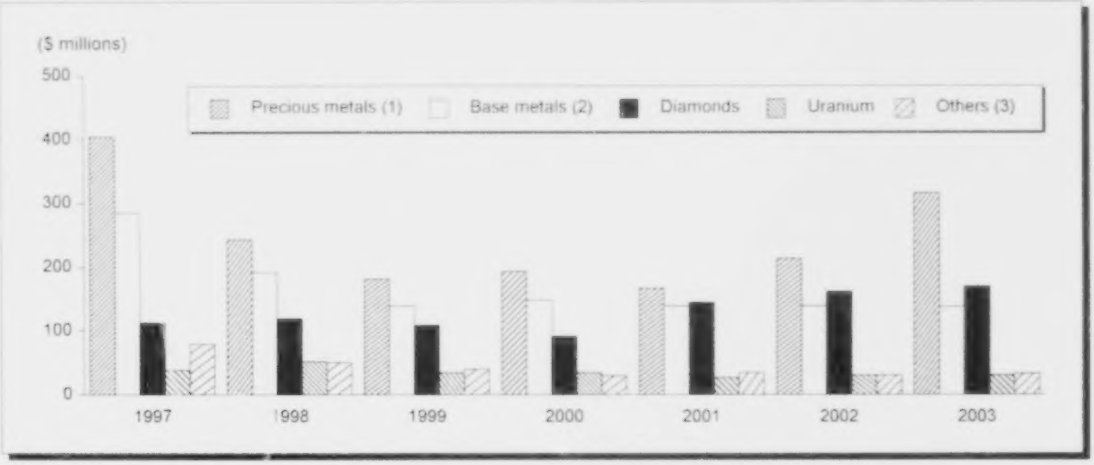
As a result of declining prices, exploration and deposit appraisal spending for precious metals (mostly gold) and base metals decreased significantly between 1997 and 2001. Precious-metal spending dropped from $405 million in 1997 ($450 million in constant 2003 dollars) to $167 million in 2001 (constant $174 million) while base-metal spending decreased from $286 million (constant $318 million) to $139 million (constant $145 million) over the same period.

In 2002, precious-metal expenditures recovered somewhat by increasing to $213 million, a 27% increase compared to the 2001 level but still far below the total of 1997 (which, in constant 2003 dollar terms, was 51% higher). In response to an improving gold price outlook, precious-metal spending increased drastically in 2003 to reach $316 million, an increase of 49% over the previous year. Because statistics on commodities sought are collected in the *Actual* survey rather than the *Preliminary* or *Spending Intentions* surveys, no such data are available yet for 2004. It will be interesting to see, when these statistics become available in 2005, how much influence the strong gold prices of 2004 will have had on expenditures for the search for this precious metal.

Figure 8

Exploration and Deposit Appraisal Expenditures in Canada, by Commodity Sought, 1997-2003

(Current Dollars)



Source: Natural Resources Canada, based on the Survey of Mineral Exploration, Deposit Appraisal and Mine Complex Development Expenditures.

(1) Includes gold, silver and platinum group metals. (2) Includes copper, nickel, lead and zinc. (3) Includes ferrous metals, other metals, nonmetals (including coal), and "not specified."

Notes: Exploration and deposit appraisal expenditures include off-mine-site and on-mine-site field and overhead expenditures, plus engineering, economic and feasibility studies, environment and land access costs. Data for 2003 are final.

The base-metal commodity group, which used to be ranked second behind precious metals, still did not show any signs of recovery in 2003. After falling by over 50% between 1997 and 1999, base-metal exploration and deposit appraisal expenditures have since remained relatively constant and amounted to $137 million in 2003.

For the third year in a row, the search for diamonds outpaced that for base metals with expenditures of $169 million. Since diamond exploration took off in earnest in Canada (back in 1993), at least $1.8 billion (in constant 2003 dollars and including only field and overhead expenditures for the years prior to 1997) has been invested in exploration and deposit appraisal activities aimed at discovering these precious gems in Canada. Considerably more has been invested in mine complex development activities and this sector continues to generate news from many areas across the country and in all stages of the mineral development cycle (**Table 27**, Appendix 2).

In 2003, the Northwest Territories was once again the recipient of most of the diamond exploration and deposit appraisal funds as $48 million was spent in that territory (**Figure 9**). Ontario ($45 million) and Nunavut ($42 million) recorded similar levels of expenditures. As a result, 2003 was the first year in the short history of the Canadian diamond mining industry that such substantial expenditures were recorded in that many jurisdictions. Québec ($18 million) and Saskatchewan ($12 million) also recorded sizeable amounts of diamond-related exploration and deposit appraisal spending. The reader can find more information on the projects responsible for these expenditures, as well as short-term mine development plans, in the respective activity reviews of the above-mentioned provinces/territories that appear in the next chapter of this report.

Table 5 combines information on both the types of companies conducting exploration and deposit appraisal activities and the types of commodities sought by these companies. In 2001, diamonds were the senior companies' favourite target with $106 million in expenditures. Base metals were second with $95 million and precious metals, reflecting an unattractive gold price, came in third with $90 million. Senior companies readjusted their spending priorities in 2002 as $122 million was spent on the search for precious metals, followed by diamonds with $120 million and base metals with $99 million. Their priorities were reaffirmed in 2003 when senior companies responded favourably to the gold price outlook and increased their spending on that commodity group to $172 million, a 41% increase over the 2002 level. Diamonds remained their second choice with spending of $106 million and base metals were again relegated to third place with expenditures of $81 million.

As for junior companies and prospectors, they continued to show a marked preference for precious-metal exploration throughout the period 2001-03. Their steadily increasing expenditures on the search for gold and platinum group metals (PGM) reached a total of $144 million in 2003, almost double the $76 million spent in 2001. Base metals and diamonds attracted almost equal amounts of investment from the junior sector over that period. However, contrary to what happened with senior companies, spending by junior companies on these two commodity groups rose significantly in 2003. During that year, junior companies spent $56 million on the search for base metals and $63 million on the search for diamonds.

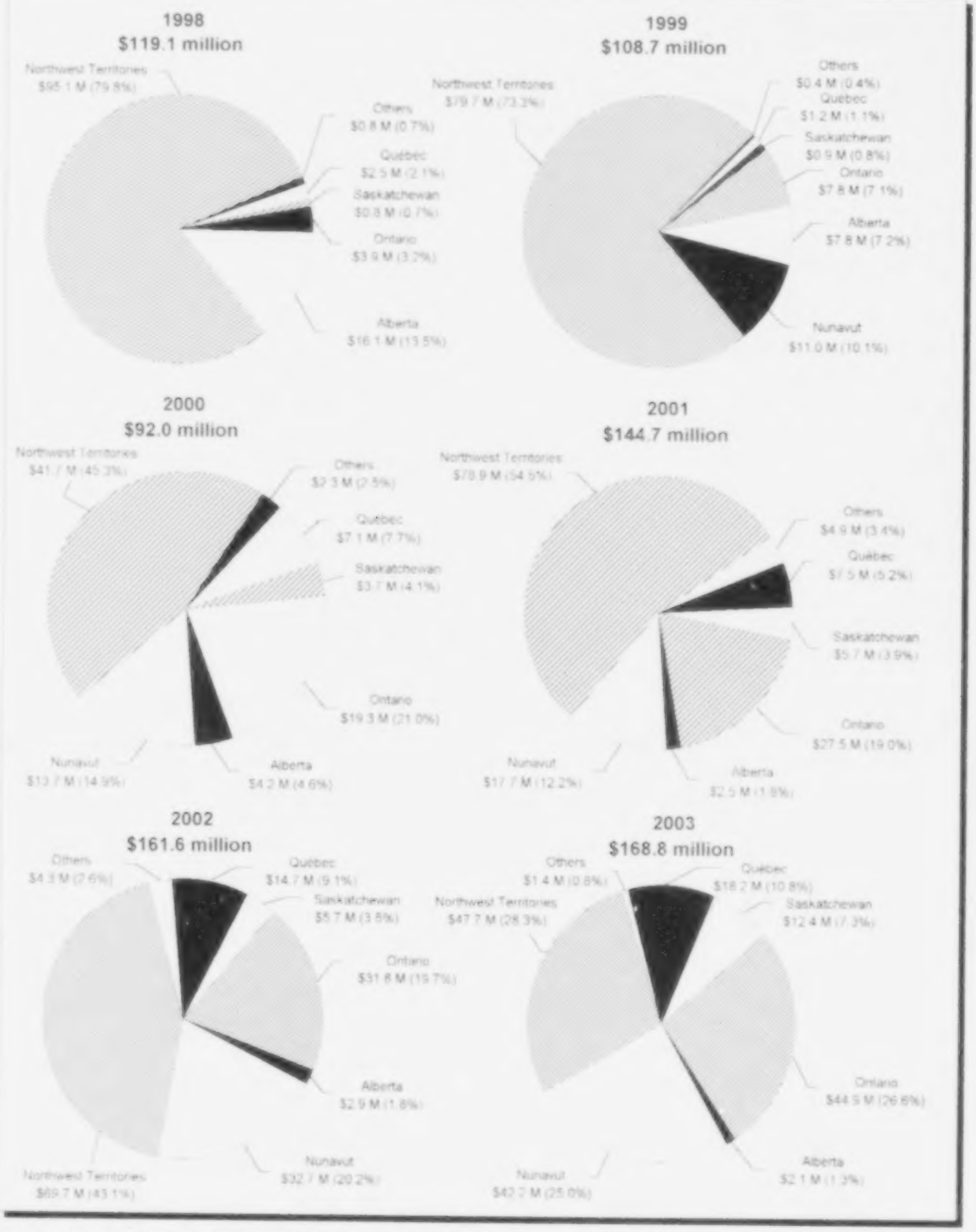
1.3.2 2004 Exploration and Deposit Appraisal Expenditures

1.3.2.1 Statistical Summary

As explained in the opening paragraphs of this chapter, company spending intentions for 2004 were compiled in January 2004 and revised in August of the same year. While this approach yields more timely forecasts of exploration and deposit appraisal expenditures, it also results in a less detailed forecast survey exercise. For instance, data on spending by type of commodity and by type of work are not available in the 2004 revised forecast results. They will only be available when the final survey results for 2004 are released later in 2005.

Figure 9

Diamond Exploration and Deposit Appraisal Expenditures in Canada, by Province and Territory, 1998-2003 (Current Dollars)



Source: Natural Resources Canada, based on the Survey of Mineral Exploration, Deposit Appraisal and Mine Complex Development Expenditures.

Notes: Exploration and deposit appraisal expenditures include off-mine-site and on-mine-site field and overhead expenditures, plus engineering, economic and feasibility studies, environment and land access costs. Numbers may not add to totals due to rounding. Data for 2003 are final.

TABLE 5. EXPLORATION AND DEPOSIT APPRAISAL EXPENDITURES IN CANADA, (1) BY TYPE OF COMPANY AND MINERAL COMMODITY, 2001-03 (Current Dollars)

Type of Company	Base Metals	Precious Metals	Uranium	Diamonds	Others (2)	Total
			($000)			
2001						
Junior companies and prospectors	44 293	76 440	1 973	39 141	15 885	177 733
Senior companies	95 150	90 482	25 116	105 555	18 833	335 136
Total	139 443	166 922	27 089	144 597	34 719	512 869
2002						
Junior companies and prospectors	40 087	91 126	1 837	41 726	16 017	190 793
Senior companies	98 761	121 671	28 234	119 918	14 044	382 628
Total	138 848	212 797	30 071	161 645	30 060	573 421
2003						
Junior companies and prospectors	55 796	144 269	2 391	62 558	18 674	283 688
Senior companies	81 204	172 144	28 389	106 256	15 054	403 047
Total	136 999	316 413	30 781	168 815	33 727	686 735

Source: Natural Resources Canada, based on the Survey of Mineral Exploration, Deposit Appraisal and Mine Complex Development Expenditures.
(1) Exploration and deposit appraisal expenditures include off-mine-site and on-mine-site costs incurred for field work and overhead, plus engineering, economic and feasibility studies, environment and land access costs. (2) Includes iron, other metals, coal and other nonmetals.
Notes: Numbers may not add to totals due to rounding. Data for 2003 are final.

Company spending intentions, compiled in January 2004 and revised in August 2004, reveal that 661 companies (project operators) and some prospectors intended to spend an impressive $979 million ($958 million in constant 2003 dollars) on exploration and deposit appraisal in Canada in 2004 (**Figures 1** and **2**). If confirmed in the *Actual* survey, this total would be the highest since 1997 when $921 million ($1024 million in constant 2003 dollars) was spent on exploration and deposit appraisal activities in Canada.

The total of 661 project operators represents a small increase (1.5%) from the 2003 total of 651 companies (expenditures of $687 million). The apparent stabilization in the number of project operators, even at a time when the availability of funds has risen by almost 43%, implies that the Canadian exploration and deposit appraisal industry has decided to focus its efforts on a manageable number of projects. The resulting increase in spending per project has taken place in an environment conditioned by strong metal prices, interesting discoveries and exploration results, generous incentive levels, and mining-friendly capital markets.

The intensity of this renewed exploration effort is evident by the number of higher-cost projects reported for 2004. Company spending intentions indicate that a total of 182 companies (115 in 2003) each intended to spend more than $1 million (**Table 1**). These 182 companies expected to spend a total of $860 million, or 88% of total intended expenditures for 2004. This $860 million total also represents a 48% increase from the $580 million spent on projects of $1 million or more in 2003.

In fact, this fourth consecutive increase in the number of project operators, from the 2000 low of 541 companies, was reflected not only in projects spending more than $1 million, but also in projects spending between $200 000 and $1 million. This movement towards higher spending per project was also supported by a general decline in the number of small projects ($200 000 or less). This favourable spending environment resulted in an overall average spending per project that was up by 40% (+$427 000 per project) over 2003.

Building on their recently generated momentum, junior companies were mostly responsible for this situation. For instance, in 2004, a total of 117 junior companies fell in the $200 000-$500 000 range, 85 in the $500 000-$1 million range, 116 in the $1 million-$5 million range, and 15 in the

$5 million-$10 million range. In 2003, the respective totals for the same spending intervals were 105, 59, 66 and 8. There were even four junior project operators that expressed their intentions to spend more than $10 million on a single project in 2004. One has to go back to 2001 to find one junior project worth that much.

These numbers reflect a healthy junior company sector that has clearly recovered from one of the worst periods in its history. Junior companies are currently riding a wave that draws its energy from strong commodity prices, a favourable demand/supply outlook, supportive government incentives and programs, and a very receptive investment community that is eager to finance the next round of mineral discoveries in Canada.

Overall, the 2004 forecast total of $979 million is both a surprise in terms of its extent and a confirmation that the better performances that were recorded in 2002 ($573 million) and 2003 ($687 million) were not isolated events. Fueled by rapidly increasing junior spending and by a slower-growing, but nevertheless solid, commitment from senior companies, the outlook for 2005 continues to be positive. In addition to the current industry momentum, factors that support this optimism include continued strength in metal prices, positive exploration results, and a very strong end to the 2004 flow-through-share season (meaning that the coffers of junior companies are full in anticipation of the 2005 field season).

Almost 60% of the total intended exploration and deposit appraisal expenditures for 2004 were reported, in decreasing order, by Ontario ($248 million), Québec ($173 million) and Nunavut ($156 million) (**Figure 2** and **Table 2**). The Northwest Territories ($111 million) and British Columbia ($107 million) also surpassed the $100 million level. For the Northwest Territories, the 2004 total represents over double the amount of 2003 ($54 million), but is also a continuation of the fluctuating levels of exploration and deposit appraisal spending brought about by the advancement of diamond projects towards mine production. In British Columbia, the $107 million in spending intentions crowns a spectacular reversal of fortunes in that province where spending had dropped to a low of $29 million in 2001. As can be expected from such an overall rise in expenditures, all provinces/territories, with the exception of Alberta, should see their spending increase in 2004.

The spending increases expected in these 11 provinces/territories should total $292 million. In dollar terms, Nunavut (+$63 million), the Northwest Territories (+$57 million), British Columbia (+$45 million) and Québec (+$39 million) are expected to record the largest increases. In percentage terms, New Brunswick should see its 2004 spending increase by a huge 581% while the Northwest Territories (+107%), the Yukon (+102%) and Nova Scotia (+92%) will rank ahead of the remaining provinces/territories that are expected to record gains ranging from 13% to 72%. As mentioned in the above paragraph, Alberta, with a 19% (-$0.9 million) decrease, will be the only Canadian jurisdiction to see its spending decrease in 2004.

The anticipated improvements in New Brunswick, Nova Scotia and the Yukon will be welcome as these jurisdictions have suffered from drastically reduced exploration and deposit appraisal spending in recent years. In New Brunswick, the increased spending will result from a concerted effort by Noranda Inc., Slam Exploration Ltd. and the provincial government to revitalize the Bathurst mining camp. In Nova Scotia and the Yukon, the search for gold, and to some extent base metals, is expected to gain in intensity.

Company spending intentions indicate that off-mine-site exploration and deposit appraisal expenditures are expected to continue on the upward trend that began after the trough of 1999 (or 2000 when using constant 2003 dollars). In 2004, off-mine-site exploration and deposit appraisal spending is expected to increase by a strong 49% from the 2003 level of $601 million and reach $897 million (**Figure 3**). Nunavut (+$63 million), the Northwest Territories (+$57 million), British Columbia (+$45 million) and Québec (+$42 million) will experience the most significant increases for that type of spending (**Figure 4**).

Overall, off-mine-site spending is expected to account for 92% of total exploration and deposit appraisal expenditures in 2004. This very high proportion of off-mine-site spending reflects a Canadian exploration and deposit appraisal sector that is currently unbalanced. Concerns about the deterioration of Canada's grassroots and off-mine-site exploration effort, which prevailed just a few years ago, are now being replaced by the issue of declining ore reserve levels, particularly at base-metal mines. It is hoped that these concerns will be addressed somewhat in 2005 and beyond as the outlook for metal prices is expected to remain positive in the short term (see Section 1.6) and the high level of off-mine-site spending eventually leads to the development of new mines.

The improved prospects for mine re-openings and mine expansions[4] will also have a role to play in the recovery of ore reserve levels, but the current lack of on-mine-site spending remains worrisome as some of these re-openings and expansions will occur strictly on the basis of improved economics for currently known reserves and resources and not because of additional discoveries. In addition, the strength of the Canadian dollar relative to the U.S. dollar will remain an important consideration in determining how much metal prices have really improved for Canadian producers and how much impetus they can derive from future increases in prices denominated in the U.S. currency.

Ontario ($52 million) and Québec ($17 million) are expected to account for 83% of the $83 million of total exploration and deposit appraisal spending that is expected to be dedicated to on-mine-site spending in 2004. Of the remaining provinces/territories, only Manitoba and British Columbia (each with about $4.5 million) are worth mentioning.

1.3.2.2 Spending by Work Phase

Company spending intentions indicate that expenditures dedicated solely to exploration activities will increase by 46% in 2004 to reach $783 million (**Figure 5**). This amount represents 80% of total intended exploration and deposit appraisal expenditures for that year. Of this $783 million total, $719 million (92%) will be incurred off mine sites (**Figure 3**).

Deposit appraisal spending is expected to amount to $196 million in 2004. At 90% of total deposit appraisal expenditures, the proportion of off-mine-site deposit appraisal spending lends strong support to the conclusion that on-mine-site work needs to be increased. However, it also indicates that the emphasis on off-mine-site projects could lead to the development and opening of new mines, possibly outside of traditional mining camps.

On a provincial/territorial basis, exploration-phase expenditures are expected to overwhelmingly surpass deposit appraisal expenditures everywhere except in the Northwest Territories (**Figure 10**). Manitoba, Nunavut and New Brunswick are expected to have virtually all of their work recorded under the exploration category. The proportion of exploration work, out of total exploration and deposit appraisal spending, in other provinces/territories is also expected to be at least 80% in the Yukon, British Columbia, Ontario, Québec and Saskatchewan.

In terms of ranking by total exploration expenditures, Ontario is expected to once again rank first with spending of $209 million. Québec ($145 million) is expected to be overtaken for second place by Nunavut ($151 million). Together these two provinces and one territory should contribute about 64% of total Canadian exploration-phase expenditures.

The Northwest Territories and Ontario are expected to lead the country in terms of deposit appraisal spending in 2004 with respective forecast expenditures of $72 million and $40 million. Deposit

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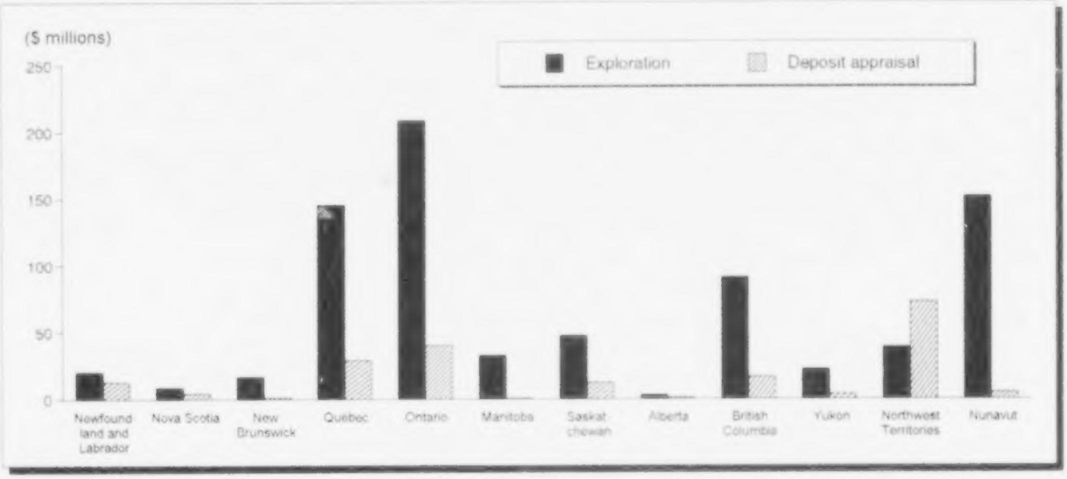
[4] For a discussion on Canadian mining production plans, see Lo-Sun Jen, "Canadian Mine Openings, Closings, Expansions, Extensions and New Mine Developments" in the 2003 edition of the *Canadian Minerals Yearbook*, Natural Resources Canada, Ottawa.

Figure 10
Exploration and Deposit Appraisal Expenditures in Canada, by Province and Territory, 2004
(Current Dollars)



Source: Natural Resources Canada, based on the Survey of Mineral Exploration, Deposit Appraisal and Mine Complex Development Expenditures.
Notes: Exploration and deposit appraisal expenditures include off-mine-site and on-mine-site field and overhead expenditures, plus engineering, economic and feasibility studies, environment and land access costs. Data for 2004 are based on revised company intentions compiled in August 2004.

appraisal spending is usually concentrated on a lower number of projects than would be the case at the exploration phase. As such, the strong showings by both the Northwest Territories and Ontario in that category can probably be explained by spending on advanced diamond projects in the former and by spending on nickel, gold and diamond projects in the latter. Québec ($29 million), British Columbia ($16 million), Newfoundland and Labrador ($13 million) and Saskatchewan ($12 million) will also figure prominently among the provinces/territories receiving the most deposit appraisal spending in 2004.

1.3.2.3 Spending by Type of Company

Based on company spending intentions compiled in January 2004 and revised in August 2004, a total of 114 senior project operators expected to spend $491 million in 2004, accounting for slightly more than 50% of all exploration and deposit appraisal expenditures for that year (**Figures 1** and **2**). Although this amount represents an increase of 22% (+$88 million) over 2003 total senior spending of $403 million, it is just enough to allow senior companies to retain their traditional lead over junior companies by a very narrow margin (less than $3 million). About 70% of total spending by senior companies is expected to be allocated to activities falling in the exploration work phase with the balance (30%) going to deposit appraisal activities **(Figure 5)**.

In 2003, 96 senior project operators had reported 59% ($403 million) of total exploration and deposit appraisal expenditures in Canada. The expected growth in spending by senior companies in 2004 can be explained by an increase in the number of companies planning to spend $1 million or more (from 41 in 2003 to 47 in 2004), by the addition of two projects in the more than $10 million spending interval, and by an average spending increase of about $2.3 million per project in that same interval (**Table 1**). The concentration of senior company spending in higher-cost projects is not a new phenomenon. It can be explained, at least partly, by the ability of these companies to generate the funds necessary to finance these undertakings and by their willingness to combine their efforts with junior companies, through acquisitions or joint ventures, to ensure that a certain stream of advanced projects remains available to sustain their mining and processing activities in the longer term.

More than three quarters (78%) of the expenditures reported by senior firms in 2004 will be incurred in Ontario, Québec, Nunavut and the Northwest Territories (in decreasing order) (**Figure 2**). Despite leading the country with $131 million in senior company spending, Ontario is still expected to record a decline of close to $18 million compared to its 2003 total of $148 million. Smaller reductions in senior company spending are also expected in Manitoba, Saskatchewan and Alberta. The Northwest Territories and Nunavut will be mostly responsible for the overall net increase (+$88 million) in senior company spending. In fact, these two territories will account for $86 million (76%) of the $112 million cumulative increase that is expected to occur in eight provinces/territories.

The number of junior project operators (including prospectors) is expected to total 547 in 2004, compared to 555 in 2003. Standing at around 550 for the second year in a row, the number of junior project operators appears to have settled after a difficult period that saw this number decline from 594 in 1997 to 424 in 2000 (**Figure 1**). The slight decrease in the number of junior project operators in 2004 will be accompanied by an imposing $205 million (+72%) jump in junior company spending (**Figure 5**). Following increases in junior company spending of $15 million in 2000, $22 million in 2001, $13 million in 2002 and $93 million in 2003, this dramatic increase brings total intended junior company spending to $488 million. This total is the highest recorded for junior company spending (in both current and constant 2003 dollars) since the survey was redesigned in 1997. Notwithstanding the differences in surveying methodologies between the old and the new survey, this total is also the highest since the all-time highs that were reached during the heyday of the Mining Exploration Depletion Allowance back in the 1986-88 period.

As could be expected with an increase of this magnitude, every mining jurisdiction in Canada is expected to experience a rise in junior company spending in 2004 (**Figure 2**). The largest increases, in dollar terms, should occur in Ontario (+$46 million) followed by Québec (+$37 million) and British Columbia (+$36 million). In terms of percentage, the largest increases should occur in New Brunswick (+361%), Manitoba (+176%), Saskatchewan (+107%) and the Yukon (+101%). In decreasing order of expenditures, Ontario, Québec, British Columbia and Nunavut as a group are expected to account for 73% of all junior company expenditures in Canada in 2004.

As previously mentioned, the rapidly increasing junior company expenditures are predicted to almost equal those of senior companies in 2004. This relative strength in junior company spending is a reflection of these companies' ability to rapidly mobilize their resources and take advantage of favourable financing conditions brought about by a positive outlook in metal markets and the availability of measures to encourage grassroots-type (or off-mine-site) exploration. The contribution of government incentives to the current rejuvenation of the Canadian junior mining sector clearly coincides with the rising trend in junior company spending. Incentives like the federal Investment Tax Credit for Exploration (ITCE), which was introduced in October 2000, and a number of harmonized and non-harmonized provincial/territorial measures were specifically designed to meet the needs of the junior mining sector and encourage grassroots-type exploration work (see the Regional Outlook section for more details on provincial/territorial incentive measures).

In fact, evidence gathered by an Intergovernmental Working Group on the Mineral Industry (IGWG) sub-working group on taxation, and submitted to the 2003 and 2004 Mines Ministers' Conferences in Halifax,[5] Nova Scotia, and Iqaluit,[6] Nunavut, strongly suggests that most of the junior company spending recorded in Canada since 2000 has indeed been financed through the issuance of flow-through shares. Data collected by Natural Resources Canada for the period October 2000 (date of introduction of the ITCE) to the end of August 2004 reveal that flow-through-share funds totaling $850 million had been raised by the industry to finance mineral exploration projects in Canada. Furthermore, this total does not even include the last four months of 2004, which, based on numerous fourth-quarter company press releases about financing initiatives and historical trends for exploration financing, will most likely turn out to be very productive in terms of flow-through-share financing.

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[5] Intergovernmental Working Group on the Mineral Industry, *Taxation Issues Relating to Exploration and the Restructuring of Resource Taxation*, Canadian Mines Ministers' Conference, Halifax, Nova Scotia, September 2003.

[6] Intergovernmental Working Group on the Mineral Industry, *Taxation Issues for the Mining Industry - 2004 Update*, Canadian Mines Ministers' Conference, Iqaluit, Nunavut, July 2004.

Another conclusion of the IGWG sub-working group on taxation was that the average size of planned flow-through-share offerings has been increasing since the introduction of the ITCE and related tax credits. A breakdown of junior exploration and deposit appraisal expenditures by range of spending tends to confirm this finding (**Table 1**). When not counting projects under the $50 000 level, junior companies typically spent $100 000 to $500 000 per project in both 2001 and 2002. However, there was a definite move towards the higher spending intervals in the latter year. In 2003, this observation was still valid as the bulk of junior company projects still amounted to $500 000 or less, but projects with higher spending ($500 000 to more than $10 million) now numbered 133, equal to the total of the previous two years in the same spending intervals. The 2004 revised company spending intentions reveal a marked preference for projects ranging from $200 000 to $5 million and, for the first time since 2001, some junior company projects (4) were expected to receive more than $10 million in expenditures. Overall, average spending per junior company project will have gone from $401 000 in 2001 to $893 000 in 2004.

1.3.2.4 Statistical Estimation of Exploration and Deposit Appraisal Spending (Based on Field and Overhead Costs Only)

1.3.2.4.1 METHODOLOGY

In this section, an attempt is made to predict the level of exploration and deposit appraisal spending for 2004 and 2005 using standard statistical estimation techniques. Expenditures are estimated by linking historical exploration and deposit appraisal spending (field and overhead expenditures only) to factors for which historical data are available.

An analysis of historical data indicates that the level of expenditures on mineral exploration and deposit appraisal work in a given year can be linked to the previous year's metal prices. This may be because companies view exploration and deposit appraisal as an investment, with expected returns on that investment dependent on expected revenues from the subsequent mining of discovered deposits. Expected future revenues would obviously depend on future mineral and metal prices, and expectations of future prices would likely be influenced by current prices. As well, metal prices influence the level of a mining company's revenues and profits and are an important determinant of the amount of internal funds available for spending on exploration and deposit appraisal.

Changes in spending are likely to lag changes in metal prices because exploration and deposit appraisal activity in a particular year is the result of a budgeting process that takes place in the preceding year. Budget allocations in a given year are therefore likely to reflect the metal prices and company profits of the preceding year.

To capture this relationship between exploration, deposit appraisal and metal prices, NRCan's yearly Metals Price Index, lagged by one year, was included in the estimating equation. This index is a Fisher Ideal Index, based on the prices of six metals: gold, silver, copper, zinc, lead and nickel.

Mineral exploration and deposit appraisal is a multi-stage process (see Appendix 2) that usually proceeds over a relatively long period of time as information is gathered from geological mapping, geophysical and geochemical surveying, diamond drilling, and so on. At various stages, this information is used by companies to decide on where to concentrate further activity and, indeed, whether to proceed at all. If early stages of exploration are successful in discovering promising mineralization, the company has a strong incentive to proceed with more detailed, and more costly, drilling and analysis, and to launch a feasibility study, thereby increasing the amount it spends on exploration and deposit appraisal.

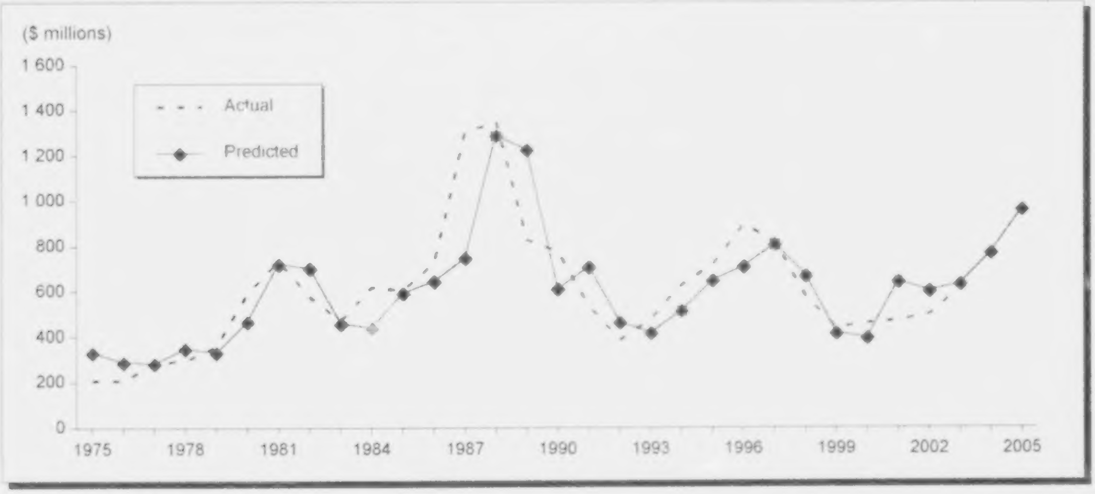
It can therefore be argued that exploration and deposit appraisal in a given period is related to spending in previous periods. To capture this relationship, a lagged dependent variable was included in the equation. As well, a dummy variable was used to capture the impact on exploration spending of two major incentive programs, the Mining Exploration Depletion Allowance (MEDA), which greatly influenced spending levels in the mid-to-late 1980s, and the federal Investment Tax Credit for Exploration (and harmonized provincial incentives), which was introduced in October 2000.

1.3.2.4.2 RESULTS

It is important to remember that the following results are based on an analysis of expenditures that include only field and overhead costs. The new categories of expenditures such as environment, land access, economic, engineering and feasibility studies were excluded for the years for which they are available (1997 onwards) in order to establish a valid comparison. It is also important to remember that diamonds are not included in NRCan's Metals Price Index and that they have accounted for much exploration and deposit appraisal spending in recent years.

Therefore, notwithstanding these caveats and using data for the years 1975-2003, the statistical equation predicts total expenditures of $770 million for 2004 and $961 million for 2005 (**Figure 11**). These estimates represent, respectively, a 25% and a 56% increase over the $614 million level that was actually recorded in 2003 for field and overhead costs (see **Table 25** in Appendix 1). If these numbers prove to be accurate, it would mean that core spending (field and overhead costs only) had increased for six consecutive years since the trough of 1999.

Figure 11
Actual and Predicted Exploration and Deposit Appraisal Expenditures in Canada, 1975-2005
(Current Dollars)



Source: Natural Resources Canada.
Note: For comparison with pre-1997 years, the data include only off-mine-site and on-mine-site field and overhead expenditures.

1.4 DRILLING

Drilling activities are an essential component of the mineral development cycle from the anomaly investigation stage to the deposit delineation and deposit definition stages. As such, drilling statistics constitute a valuable indicator of recent levels of Canadian mineral exploration and deposit appraisal activity.

Diamond drilling is the most widely used drilling method for determining the existence, location, extent, grade and tonnage of a mineral deposit. This type of drilling figures in most of the following analysis although, in some cases, other types of drilling are also considered. The data are from the Survey of Mineral Exploration, Deposit Appraisal and Mine Complex Development Expenditures and include all metres (m) drilled and expenditures reported by companies for their "own account" (drilling they did themselves) and for contracted drilling work.

1.4.1 Drilling by Work Phase

According to the federal-provincial/territorial survey, a total of 2 553 000 m of surface and underground drilling (including diamond drilling and other drilling methods) was carried out for exploration and deposit appraisal purposes in Canada in 2003, compared to 2 418 000 m in 2002 (**Tables 6** and 7). Of this total, 2 492 000 m was accounted for by diamond drilling, up by 8% from the 2 306 000 m drilled in 2002. The best diamond drilling years in the 1985-2003 period occured in 1987 and 1988 (with the help of the Mining Exploration Depletion Allowance), in 1989 and 1990 (with the help of the Canadian Exploration Incentive Program), and in 1996 and 1997 (when the interest generated by the Voisey's Bay nickel-copper-cobalt deposit in Newfoundland and Labrador and by diamond discoveries in the North resulted in increased activity in these regions and else-

TABLE 6. SURFACE AND UNDERGROUND EXPLORATION AND DEPOSIT APPRAISAL DRILLING IN CANADA, (1) BY PROVINCE AND TERRITORY, 2002 AND 2003

	Surface Drilling			Underground Drilling			Total Drilling		
Province/Territory	Exploration	Deposit Appraisal	Total	Exploration	Deposit Appraisal	Total	Exploration	Deposit Appraisal	Total
					(000 m)				
2002									
Newfoundland and Labrador	56.1	9.6	65.7	0.4	–	0.4	56.5	9.6	66.1
Nova Scotia	5.4	–	5.4	–	–	–	5.4	–	5.4
New Brunswick	20.9	–	20.9	–	–	–	20.9	–	20.9
Québec	294.6	75.0	369.5	192.2	179.7	371.8	486.7	254.6	741.4
Ontario	536.7	49.1	585.8	211.6	51.6	263.1	748.3	100.6	848.9
Manitoba	69.3	–	69.3	60.6	42.4	103.0	129.9	42.4	172.3
Saskatchewan	113.7	–	113.7	4.9	–	4.9	118.6	–	118.6
Alberta	86.5	–	86.5	–	–	–	86.5	–	86.5
British Columbia	170.2	24.7	194.9	0.5	–	0.5	170.7	24.7	195.4
Yukon	8.8	–	8.8	2.5	–	2.5	11.3	–	11.3
Northwest Territories	23.7	21.5	45.2	–	–	–	23.7	21.5	45.2
Nunavut	69.4	34.9	104.4	1.3	–	1.3	70.7	34.9	105.7
Total	1 455.1	214.8	1 669.9	473.9	273.6	747.6	1 929.1	488.4	2 417.5
2003									
Newfoundland and Labrador	42.6	12.0	54.5	–	–	–	42.6	12.0	54.5
Nova Scotia	11.3	0.1	11.4	1.6	–	1.6	12.9	0.1	13.0
New Brunswick	9.2	–	9.2	–	–	–	9.2	–	9.2
Québec	394.5	51.1	445.6	–	81.0	81.0	394.5	132.1	526.6
Ontario	810.0	33.3	843.3	72.4	87.2	159.6	882.4	120.5	1 002.9
Manitoba	75.4	0.2	75.5	228.7	–	228.7	304.1	0.2	304.3
Saskatchewan	97.8	1.1	99.0	64.7	–	64.7	162.5	1.1	163.7
Alberta	7.9	13.6	21.5	22.6	–	22.6	30.5	13.6	44.1
British Columbia	208.2	45.6	253.8	–	0.5	0.5	208.2	46.1	254.3
Yukon	16.0	–	16.0	7.4	–	7.4	23.4	–	23.4
Northwest Territories	25.5	9.4	34.9	0.3	–	0.3	25.8	9.4	35.2
Nunavut	101.3	20.0	121.4	–	–	–	101.3	20.0	121.4
Total	1 799.7	186.4	1 986.1	397.7	168.7	566.4	2 197.4	355.2	2 552.5

Source: Natural Resources Canada, based on the Survey of Mineral Exploration, Deposit Appraisal and Mine Complex Development Expenditures.
– Nil
(1) Includes diamond drilling and other drilling methods such as rotary and percussion.
Note: Numbers may not add to totals due to rounding.

TABLE 7. SURFACE AND UNDERGROUND EXPLORATION AND DEPOSIT APPRAISAL DRILLING IN CANADA, 1985-2003

	Diamond Drilling			Other Drilling (1)		
	Metres Drilled			Metres Drilled		
Year	Exploration	Deposit Appraisal	Total	Exploration	Deposit Appraisal	Total
			(000 m)			
1985	..	..	2 531	..	..	270
1986	..	..	3 616	..	..	55
1987	..	..	6 221	..	..	262
1988	..	..	6 206	..	..	211
1989	..	..	3 940	..	..	297
1990	..	..	3 702	..	..	241
1991	..	..	2 341	..	..	234
1992	..	..	1 889	..	..	139
1993	..	..	1 932	..	..	282
1994	..	..	2 626	..	..	213
1995	..	..	2 993	..	..	280
1996	..	..	3 898	..	..	169
1997 (a)	2 670	734	3 404	157	239	396
1998	2 024	433	2 458	58	82	140
1999	1 693	583	2 277	62	127	189
2000	1 490	559	2 049	22	9	31
2001	1 359	321	1 679	83	4	87
2002	1 830	476	2 306	99	13	112
2003	2 165	327	2 492	33	28	61

Source: Natural Resources Canada, based on the Survey of Mineral Exploration, Deposit Appraisal and Mine Complex Development Expenditures.

.. Not available.

(a) The exploration and deposit appraisal phases were adopted as part of the survey redesign in 1997.

(1) Other drilling methods include rotary and percussion.

where). Once they become available, it will be interesting to see how the 2004 drilling statistics reflect the significant increase in exploration and deposit appraisal spending that took place during that year.

Reflecting the increasing concentration of activities on grassroots and off-mine-site types of work, some 86% (2 197 000 m) of the total drilling activity in 2003 was dedicated to the exploration phase while the remaining 14% (355 000 m) was dedicated to deposit appraisal work. In terms of provincial/territorial rankings, Ontario dominated exploration-phase drilling with 40% of the total metres drilled for that year while Québec and Manitoba combined for another 32%. On the deposit appraisal side, Ontario and Québec accounted for 71% of all drilling in that work phase.

1.4.2 Drilling by Type of Company

In 2003, senior companies accounted for 65% (1 670 000 m) of all surface and underground drilling (including diamond drilling and other drilling methods) in the exploration and deposit appraisal phases (**Table 8**). In 2002, that proportion had been 70% (1 697 000 m out of a total 2 418 000 m). Although the numbers for 2004 are not yet available, the rapidly increasing junior expenditures could well lead to a further gain in the importance of junior companies for drilling activity in Canada.

In terms of surface and underground drilling, senior companies once again accounted for virtually all of the underground drilling in each of the two work phases. Also in line with earlier years, surface drilling activity was more evenly distributed as senior companies accounted for 56% (1 113 000 m) of the total compared to 44% (873 000 m) for junior companies. The latter's total meterage represented a 23% increase from the 2002 level of 712 000 m, marking another year of improvement for surface drilling by this type of company. Senior companies, on the other hand, saw their surface drilling activity increase by 16% and their underground drilling activity decrease by 25%.

TABLE 8. SURFACE AND UNDERGROUND EXPLORATION AND DEPOSIT APPRAISAL DRILLING (1) IN CANADA, BY TYPE OF COMPANY, 2002 AND 2003

Type of Company	Exploration Drilling	Deposit Appraisal Drilling	Total by Type of Company
		(000 m)	
2002			
Junior companies			
Surface	659.7	52.4	712.2
Underground	8.2	–	8.2
Subtotal	667.9	52.4	720.4
Senior companies			
Surface	795.4	162.4	957.8
Underground	465.7	273.6	739.4
Subtotal	1 261.2	436.0	1 697.1
Total	1 929.1	488.4	2 417.5
2003			
Junior companies			
Surface	809.4	63.3	872.7
Underground	7.7	2.5	10.2
Subtotal	817.1	65.8	882.9
Senior companies			
Surface	990.3	123.1	1 113.4
Underground	390.0	166.2	556.2
Subtotal	1 380.3	289.4	1 669.7
Total	2 197.4	355.2	2 552.5

Source: Natural Resources Canada, based on the Survey of Mineral Exploration, Deposit Appraisal and Mine Complex Development Expenditures.
– Nil.
(1) Includes diamond drilling and other drilling methods such as rotary and percussion.

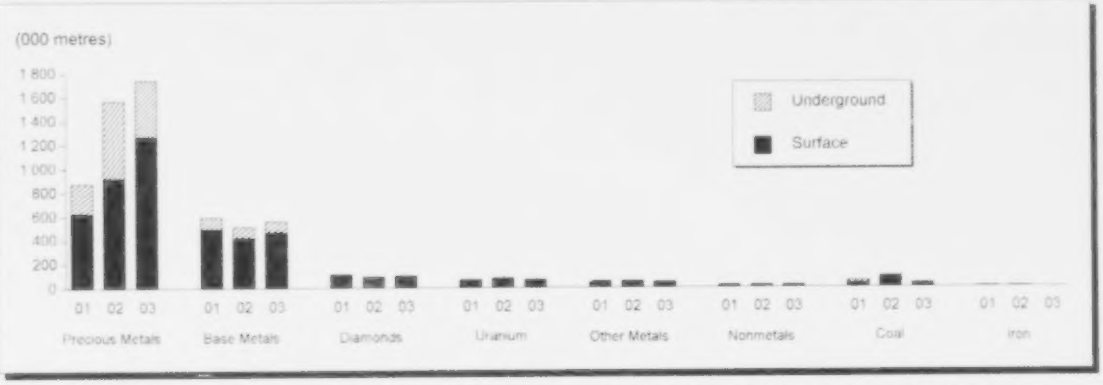
Exploration-phase drilling by senior companies was mostly conducted from the surface while their deposit appraisal drilling mostly took place underground. As can be expected, the drilling activities of junior companies were almost exclusively focused on surface exploration and deposit appraisal.

1.4.3 Drilling by Type of Commodity Sought

In terms of total surface and underground drilling (including diamond drilling and other drilling methods) by group of commodity sought, **Figure 12** shows that exploration and deposit appraisal drilling activities in Canada in the period 2001-03 were primarily aimed at the discovery of precious metals and base metals. In 2003, a total of 1 741 000 m was drilled in the search for precious metals, representing 68% of total exploration and deposit appraisal drilling. Of this total, 1 268 000 m (73%) was drilled from the surface. Drilling for base metals accounted for 22% (555 000 m) of total exploration and deposit appraisal drilling and, once again, surface drilling was more prevalent with 84% (468 000 m) of the drilling aimed at this commodity group. The continued lack of underground drilling aimed at discovering base metals further reinforces the concerns over declining reserve levels at existing mines.

Surface drilling also accounted for most of the exploration and deposit appraisal drilling activity targeting commodities other than precious metals and base metals in 2003. In fact, it represented all of the drilling conducted within these two phases of activity for the discovery of diamonds, uranium, nonmetals, coal and iron.

Figure 12
Surface and Underground Exploration and Deposit Appraisal Drilling (1) in Canada, by Commodity, 2001-03



Source: Natural Resources Canada, based on the Survey of Mineral Exploration, Deposit Appraisal and Mine Complex Development Expenditures.
(1) Includes diamond drilling and other drilling methods such as rotary and percussion.

1.5 CLAIM STAKING

Claim staking is another useful indicator of exploration activity. It is particularly efficient at rapidly highlighting emerging trends, such as the mid- and late-1990s exploration rush for diamonds, and at pinpointing areas of interest. Because claim staking usually happens at a relatively early stage of the exploration and deposit appraisal process, it also provides a good measure of current grassroots-type activities and a good insight into where future advanced (deposit appraisal) work could be focused.

Claim staking rules and guidelines differ across Canada. In recent years, mineral tenure has evolved with the advent of map staking and the granting of mineral rights to Aboriginal groups who now administer their own regimes. Therefore, in order to ensure timeliness and accuracy of information on mineral tenure regulations in a particular Canadian jurisdiction, the reader is invited to contact the respective provincial/territorial mining recorder's office. Another useful source of information that summarizes the different mineral rights regimes found across Canada (i.e., ground vs. map staking; prospecting permits vs. claims; cost and size of claims, permits and leases; assessment work requirements; etc.) is the Provincial/Territorial Mining Rights Committee. This committee meets on an annual basis and maintains a number of summary tables on the administration of mineral tenure in Canada. One portal where these tables can be viewed is the web site of the Ontario Ministry of Northern Development and Mines at www.mndm.gov.on.ca/mndm/mines/lands.

1.5.1 New Claims Staked

The area of new mineral claims staked in Canada in 2003 (**Table 9**) totaled 10.4 million hectares (Mha), some 6.5 Mha (38%) less than the area recorded in 2002. The largest area of new mineral claims recorded in a single year in Canada was 44 Mha in 1997, followed by 37 Mha in 1992 and 27 Mha in 1993. The total recorded for 2002 (16.9 Mha) compares favourably to the levels recorded prior to 1992, that is, prior to the major exploration and deposit appraisal efforts that were triggered by the discovery of diamonds in the Northwest Territories and, later, base metals in Labrador. While significantly less than the previous year and more comparable to the levels of 2000 and 2001, the total for 2003 signals a consolidation of diamond exploration properties rather than a lack of interest on the part of companies in that and other commodities. This consolidation follows 2002 staking rushes in Québec and Nunavut and also reflects further adjustments in Alberta and the Northwest Territories.

TABLE 9. AREA OF NEW MINERAL CLAIMS (1) STAKED IN CANADA, 2002 AND 2003

Province/Territory	2002		2003	
	(hectares)	(%)	(hectares)	(%)
Newfoundland and Labrador	(r) 828 150	4.9	338 675	3.3
Nova Scotia	147 713	0.9	202 784	1.9
New Brunswick	33 888	0.2	46 976	0.5
Québec	3 290 446	19.5	1 204 523	11.6
Ontario	813 424	4.8	951 488	9.1
Manitoba	1 287 997	7.6	879 155	8.5
Saskatchewan	339 490	2.0	438 819	4.2
Alberta	4 670 028	27.6	2 904 300	27.9
British Columbia	688 500	4.1	912 575	8.8
Yukon	81 872	0.5	75 038	0.7
Northwest Territories	1 099 888	6.5	391 000	3.8
Nunavut	3 623 559	21.4	2 054 000	19.8
Total	(r) 16 904 955	100.0	10 399 333	100.0

Source: Provincial and territorial mining recorders.
(r) Revised.
(1) Excludes coal.

Although no single province/territory recorded a rise in 2003 in the area of new mineral claims staked comparable to those recorded in recent years (e.g., +3.2 Mha for Nunavut in 2002, +1.8 Mha for Alberta in 2000 and +1.2 Mha for Québec in 2002), British Columbia (+224 000 ha), Ontario (+138 000 ha) and Saskatchewan (+99 000 ha) saw their levels increase by 33%, 17% and 29%, respectively. The largest declines were noted in Québec (-2.1 Mha), Alberta (-1.8 Mha) and Nunavut (-1.6 Mha). Together these three jurisdictions accounted for 77% of the total decline of 7.0 Mha that occured in seven provinces/territories.

In terms of area occupied by claims in good standing at the end of 2003, Alberta remained in the lead with 10.2 Mha. However, its area continued to decrease following the high of 1998 when 42.8 Mha, or 65% of the province, was covered by claims in good standing as the result of a staking rush that was initiated by the discovery of kimberlites in the Buffalo Head hills. Nunavut (7 145 000 ha) and Québec (6 536 115 ha) registered the second and third largest areas of claims in good standing in 2003 (**Table 10**).

1.5.2 Claims in Good Standing

Although there were provincial/territorial fluctuations, the total area occupied by claims in good standing amounted to approximately 4.1% of Canada's total landmass in both 2002 and 2003. Losses in the area occupied by claims in good standing in Alberta (-1 Mha), the Northwest Territories (-0.7 Mha) and Québec (-0.2 Mha) were more than offset by gains in Nunavut (+1.6 Mha) and British Columbia (+0.5 Mha). Therefore, the ever-changing picture of claims in good standing in Canada probably reflected, in 2003, a continuation of the exploration effort for diamonds but, at the same time, a continued consolidation of existing diamond properties. In addition, there appeared to be a growing focus on gold exploration (in light of an improved price outlook) as demonstrated by increases in the area of claims in good standing in British Columbia, Nunavut, Ontario, Nova Scotia and the Yukon.

In 2003, spending per hectare of claims in good standing ranged between $0.47/ha in Alberta and $56.75/ha in Ontario (**Figure 13**). Variations in this ratio can often be explained by the type of staking (ground vs. map) and the size of the claims or permits rather than by the actual intensity of exploration (more advanced vs. reconnaissance-type work) in a given province/territory. However, in this case, Ontario once again demonstrates that it is the Canadian leader in exploration and deposit appraisal spending and that companies continue to seriously explore the ground positions that they hold in this province. For Canada as a whole, exploration and deposit appraisal spending

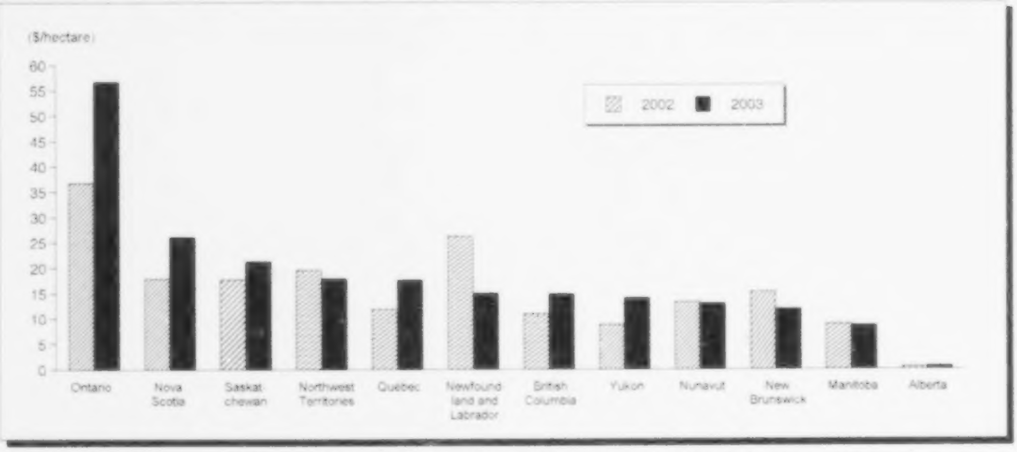
TABLE 10. AREA OCCUPIED BY CLAIMS IN GOOD STANDING IN CANADA, 2002 AND 2003

Province/Territory	Total Area	Area of Claims in Good Standing	Area of Claims/ Total Area
	(hectares)		(%)
2002			
Newfoundland and Labrador	40 572 000	1 638 959	4.0
Nova Scotia	5 549 000	186 354	3.4
New Brunswick	7 344 000	210 656	2.9
Québec	154 068 000	6 767 500	4.4
Ontario	106 858 000	2 881 168	2.7
Manitoba	54 995 000	2 464 233	3.8
Saskatchewan	65 233 000	2 287 597	3.5
Alberta	66 119 000	11 207 245	17.0
British Columbia	94 931 000	3 369 400	3.5
Yukon	48 345 000	887 221	1.8
Northwest Territories	143 232 000	3 687 073	2.6
Nunavut	199 400 000	5 581 181	2.8
Total Canada	996 646 000	41 168 587	4.1
2003			
Newfoundland and Labrador	40 572 000	1 502 769	3.7
Nova Scotia	5 549 000	218 470	3.9
New Brunswick	7 344 000	215 888	2.9
Québec	154 068 000	6 536 115	4.2
Ontario	106 858 000	2 927 120	2.7
Manitoba	64 995 000	2 578 114	4.0
Saskatchewan	65 233 000	2 170 000	3.3
Alberta	66 119 000	10 194 320	15.4
British Columbia	94 931 000	3 894 925	4.1
Yukon	48 345 000	900 236	1.9
Northwest Territories	143 232 000	3 003 000	2.1
Nunavut	199 400 000	7 145 000	3.6
Total Canada	996 646 000	41 285 957	4.1

Sources: Natural Resources Canada; provincial/territorial mining recorders.
Note: Data for Prince Edward Island are excluded.

Figure 13

Off-Mine-Site Exploration and Deposit Appraisal Expenditures Per Hectare of Claims in Good Standing in Canada, by Province and Territory, 2002 and 2003



Sources: Natural Resources Canada, based on the Survey of Mineral Exploration, Deposit Appraisal and Mine Complex Development Expenditures; provincial/territorial mining recorder offices.
Notes: Off-mine-site exploration and deposit appraisal expenditures include costs incurred off-mine-site for field work and overhead, plus engineering, economic and feasibility studies, environment and land access costs. "Claims in good standing" excludes mining leases. Data for 2002 and 2003 are final.

(off-mine-site) amounted to an average of $14.56/ha of claims in good standing in 2003, a significant 22% increase over the $11.98/ha recorded in 2002.

1.6 SHORT-TERM OUTLOOK FOR METAL PRICES

In 2004, metal prices continued the recovery that began in 2002 and followed through into 2003. At the end of 2004, NRCan's monthly Metals Price Index (**Figure 44** in Appendix 1) stood at levels not seen since the late 1980s with monthly average prices for copper, nickel and gold at 15-year highs. As a testimony to the cyclical nature of metal markets, this recovery followed a period of several years, terminating at the end of 2001, when prices for some metals reached 14-year lows.

Nickel prices led the way over the recovery period, with the price as a whole for 2004 averaging US$6.27/lb, about 130% above the average price for 2001, before the recovery began. The monthly average for December 2004 was US$6.25/lb.

Lead prices averaged US40.2¢/lb in 2004, 72% higher than the average for 2003. Its December 2004 average was US44.2¢/lb. Copper averaged US$1.30/lb for 2004, up 61% over 2003, with its December 2004 average at US$1.43/lb. Zinc averaged US47.5¢/lb overall for 2004, up 27% over the average for 2003. It finished the year with a December monthly average of US53.5¢/lb.

Booming economic growth and high demand for metals in China, an economic recovery in the United States and Japan that caused a rebound in metals consumption, and supply constraints for some metals were factors in this recovery. Although measures by the Chinese government to restrict lending in some sectors of the economy and interest rate increases by China's central bank will result in weaker economic growth in that country, China's economy will continue to be a substantial source of growth for base-metals demand. This, together with inventory shortages in some metals such as copper, lead and nickel, should keep base-metal prices strong well into 2005.

As for gold, its average price recorded a 13% increase in 2004 to reach US$410/oz. The strength of the gold price has been attributed to such events as the continuing conflict in Iraq and the weak U.S. dollar. Low interest rates in the United States and record U.S. trade and current account deficits will likely continue to keep the U.S. currency weak. This, together with the agreement by central banks to limit sales, de-hedging by producers and increasing demand for physical gold, particularly in India and China, should help keep upward pressure on the price of gold in the foreseeable future.

1.7 TAX INCENTIVES AND THE RECOVERY IN MINERAL EXPLORATION EXPENDITURE LEVELS

The latest downturn in exploration and deposit appraisal spending, which began slowly in 1997 and bottomed out in 2000, led to a considerable weakening of Canada's famed junior mining sector, to a significant reduction in the country's mineral reserves of gold and base metals, and to consequent mine closures and job losses. In response to demands for assistance from affected stakeholders (exploration and mining industry, communities, provinces/territories), the federal government introduced the Investment Tax Credit for Exploration (ITCE) in October 2000. This 15% non-refundable federal tax credit, available only to individual investors in flow-through shares of exploration and mining companies, initially proposed for a three-year period, was extended in the 2003 and 2004 federal budgets. It is now scheduled to be phased out at the end of 2005, but issuing corporations will still be able to continue to incur expenditures related to flow-through-share arrangements until the end of 2006. These extensions to the ITCE were granted following recommendations from Canada's Mines Ministers, to whom the IGWG sub-working group on taxation had reported on the effectiveness of tax credits in three consecutive reports on taxation issues (see earlier reference to two of these reports in Section 1.3.2.3).

A number of provinces/territories also chose to further encourage mineral exploration with tax-based incentives and introduced their own measures. Ontario, Saskatchewan, British Columbia and Manitoba chose to harmonize, or partially harmonize, their tax credits with the structure of the federal ITCE. Québec continued its refundable corporate tax credit for exploration and development of resources, as well as its additional deductions for flow-through shares, and the Yukon increased the rate of its refundable corporate and personal income tax credit. New Brunswick adopted a different approach. It decided to participate in the search for additional reserves for the Brunswick zinc-lead mine by entering into a partnership with Noranda Inc. and Slam Exploration Ltd. The Bathurst Joint Venture could spend up to $25 million in the Bathurst mining camp during the 2003-08 period. (The reader can learn more about these measures and other provincial/territorial programs in the respective provincial/territorial reviews of activities that appear in Section 2 and on the web sites of respective ministries/departments responsible for mining.)

In its 2002 report, the IGWG sub-working group on taxation, which had for its mandate the evaluation of the effectiveness of these temporary incentives prior to their termination dates, concluded that the ITCE had been reasonably successful in maintaining access to exploration financing for junior companies. The timing of the introduction of the harmonized provincial tax credits and the time it took for industry and investors to adjust to these various programs led to an initially slow uptake on the part of investors. A year later, when it reported to the 2003 Mines Ministers' Conference in Halifax, Nova Scotia, the sub-working group was able to demonstrate that, with the aid of a stronger gold price and interesting diamond discoveries, the various incentives had been a strong contributing factor in helping Canada achieve higher exploration levels. In particular, junior company and grassroots exploration spending were up significantly.

These findings remained valid when the Mines Ministers met in Iqaluit, Nunavut, in the summer of 2004 in the midst of what would be one of the best field seasons in years. The striking increase in junior company spending, the rising proportion of off-mine-site expenditures, the increased flow-through-share financing activity and other indicators show that the ITCE and related tax incentive measures did indeed act as catalysts for mineral exploration investment when the prices of precious metals and base metals finally recovered.

Since these incentives have helped revitalize the all-important junior mining sector and ensure adequate levels of exploration-phase expenditures, the question that must now be answered is whether these incentives (i.e., the tax credits) need to be extended. In briefs to the Mines Ministers and to the federal Department of Finance, industry associations (Prospectors and Developers Association of Canada, The Mining Association of Canada, Association de l'exploration minière du Québec) have argued for the continuation of the ITCE and even for rendering this feature of the *Income Tax Act* permanent.

Another issue that needs consideration is the fact that the exploration effort is currently concentrated on grassroots and off-mine-site types of exploration. Too little deposit appraisal and on-mine-site work are a real cause for concern, particularly in mature mining camps where some mines are facing ore reserves challenges. The next generation of government initiatives to help sustain the Canadian mining industry should perhaps address these concerns about the more advanced work phases of the mineral development cycle.

1.8 SHORT-TERM OUTLOOK FOR EXPLORATION AND DEPOSIT APPRAISAL SPENDING IN CANADA

The three key indicators of exploration and deposit appraisal activity (drilling, claim staking and, in particular, spending) reveal that this essential component of the Canadian mining industry has recovered from one of its worst downturns. However, due to uncertainty about the long-term direction of metal prices and ready access to financing, it remains to be seen whether exploration and deposit appraisal expenditure levels in the order of the $979 million spent in 2004 can be repeated on a longer-term basis.

Still, the outlook for 2005 has to be positive if only for the fact that the same favourable conditions that led to the strong 2004 showing were still present at the beginning of the year. Metal prices are expected to remain strong, no tax credit is scheduled to expire before the end of the year, and the rising popularity of flow-through shares highlights the strong appetite of investors for mineral exploration projects. In addition, the existence of a large inventory of mineral deposits requiring further investigation and the opportunities revealed by the substantial sums recently injected into mineral exploration activity should generate a fair amount of follow-up work and new projects.

Exploration and deposit appraisal expenditures by junior mining companies soared to a 16-year high in 2004 and the junior sector should continue to perform well in 2005. Senior companies, on the other hand, have been slower to increase their exploration and deposit appraisal activities in Canada. It would be interesting to see an intensification of these companies' activities since there is a need for more advanced exploration and deposit appraisal work and for new on-mine-site initiatives to increase ore reserve levels and prolong the lives of certain Canadian mines and mining camps.

Overall, 2005 will probably turn out to be another good year for the Canadian mineral exploration sector.

2. Regional Outlook

2.1 INTRODUCTION

This section presents comments from provincial and territorial officials on recent exploration and deposit appraisal activities in their respective jurisdictions and indicates their expectations for 2004 and beyond. It also highlights important fiscal, regulatory and geoscientific initiatives.

The reader should note that some provinces/territories, in their respective review of activities, use the term "exploration" in its broad sense; that is, it includes both exploration (grassroots) and deposit appraisal (advanced) components. The expenditure data mentioned by the different provincial and territorial authorities may also differ from those reported in Chapter 1 (official federal-provincial/territorial figures released by NRCan) because some of these jurisdictions use different criteria or definitions in their own analyses.

2.2 NEWFOUNDLAND AND LABRADOR[7]

2003 Overview and 2004-2005 Forecasts

Expenditures on mineral exploration in Newfoundland and Labrador totaled $23 million in 2003, a 48% decrease from the previous year (**Table 11**). The decline is attributable to a change in focus at the Voisey's Bay nickel exploration site in Labrador where, following the March 2003 decision to proceed with production, the main effort switched to infrastructure development for the future mine. The resulting 80% decrease in exploration expenditures for base metals in Labrador was only partly offset by a 25% increase in the value of base-metal exploration and a 40% increase in the value of gold exploration on the Island of Newfoundland.

In 2003, base-metal exploration accounted for 49.2% of total expenditures, closely followed by precious metals at 42.5% and then by other commodities (e.g., iron ore, dimension stone and industrial minerals) at 8.3%. Almost 98% of precious-metal exploration took place in Newfoundland whereas 55-60% of base-metal and other-commodities exploration occurred in Labrador.

Claim staking dropped back to 13 547 in 2003, a decrease of 60% from 2002 when there was a small staking rush for gold in Newfoundland. Claims in good standing at year-end decreased only 8.5% over the same time period (**Table 11**). Diamond-drilling activity decreased by 12% in 2003 to 58 618 metres (m).

In 2003, exploration and deposit appraisal spending highlights for Labrador consisted of approximately $3 million at Voisey's Bay by Voisey's Bay Nickel Company Limited, mostly at the Ovoid nickel-copper-cobalt deposit, and almost $2 million by Falconbridge Limited at South Voisey as an earn-in option from the SVB Nickel Company Limited-Commander Resources Ltd. partnership.

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[7] The Newfoundland and Labrador review of activities was prepared by Ges Nunn. For more information, the reader is invited to contact Mr. Nunn by telephone at (709) 729-6418 or by e-mail at gesnunn@gov.nl.ca.

TABLE 11. NEWFOUNDLAND AND LABRADOR EXPLORATION STATISTICS, 1997-2005

	1997	1998	1999	2000	2001	2002	2003	2004 (p)	2005 (f)
					(dollars)				
Exploration expenditures	71 752 000	47 855 216	32 353 000	27 316 669	28 441 725	44 189 877	23 073 735	28 762 883	40 300 000
Base metals	61 420 000	35 289 730	25 000 000	19 246 046	22 585 446	33 975 242	11 353 274	. .	. .
Precious metals (gold)	5 228 072	3 213 618	4 767 000	6 381 634	2 720 449	7 000 053	9 796 698	. .	. .
Other	2 336 828	12 366 652	2 586 000	1 179 312	3 135 830	3 214 582	1 923 763	. .	. .
					(number)				
Claim staking (year-end)									
Claims staked	13 363	14 476	9 643	12 969	15 665	33 126	13 547	19 343	12 000
Claims in good standing	126 766	86 955	57 431	46 880	47 425	66 287	60 654	64 469	60 000
					(metres)				
Diamond drilling	154 638	95 395	116 263	74 546	47 176	66 696	58 618	75 000	80 000
Exploration	141 320	90 428	112 095	67 626	39 455	52 633	52 030	. .	. .
Production/development	13 318	4 967	4 168	6 920	7 721	14 063	6 588	. .	. .

Source: Newfoundland and Labrador Department of Natural Resources.
. . Not available; (f) Forecast; (p) Preliminary.

Spending highlights for the Island of Newfoundland in 2003 include: over $2.5 million by Rubicon Minerals Corporation, mostly at Golden Promise in west-central Newfoundland, and near Glenwood in the Botwood Basin of northeast-central Newfoundland; and almost $2.25 million by Altius Resources Inc., mostly at Moosehead in north-central Newfoundland, at Rocky Brook in western Newfoundland, and at Rambler North on the Baie Verte Peninsula. Cornerstone Resources Inc. and International Lima Resources Corp. (now Crosshair Exploration & Mining Corp.) spent around three quarters of a million dollars each on various projects.

For 2004, all preliminary exploration parameters show an increase (**Table 11**). Claim staking increased to 19 343, on the back of renewed exploration for nickel and uranium in Labrador, and claims in good standing ended the year at 64 469. Exploration expenditures are estimated to increase approximately 25%, to around $28 million, and diamond drilling is still a forecast at approximately 75 000 m; both increases are partly a result of the gold exploration programs initiated by the 2002 staking in Newfoundland moving into a more advanced stage.

The longer-range forecast for 2005 is for claim staking to return to historical levels at around 12 000, but for renewed exploration interest in Labrador with exploration expenditures at around $40 million.

Mining

Two new mines are to open in Newfoundland.

On December 14, 2004, Aur Resources Inc. announced that it would proceed with the development of the Duck Pond and Boundary deposits on its Tally Pond property, centred approximately 35 km east-southeast of Buchans in central Newfoundland. Geotechnical and engineering work and infrastructure development have commenced; this work is estimated at $92 million spread over 2005-06. The mine is scheduled to start producing late in 2006.

The deposits contain reserves of approximately 4.1 million tonnes (Mt) at an average grade of 5.68% zinc, 3.29% copper, 59.3 g/t silver and 0.86 g/t gold. A planned 3.7 Mt will be mined from underground at the Duck Pond deposit and 0.4 Mt will be extracted by open pit at the Boundary deposit. Production will consist of 76 million pounds (lb) of zinc, 41 million lb of copper, 536 000 ounces (oz) of silver and 4100 oz of gold annually from 2007 to 2014. Potential mining of an additional inferred resource of 1.1 Mt grading 7.05% zinc, 3.04% copper, 71.2 g/t silver and 0.81 g/t gold could add two years to the life of the mine.

In January 2005, Anaconda Gold Corp. received a positive feasibility study for the Pine Cove gold deposit, on the Baie Verte Peninsula, and plans to put the property into production by year-end. An indicated resource of 2 216 000 tonnes (t) grading 2.94 g/t gold and an inferred resource of 837 000 t grading 2.2 g/t gold were reported for an approximate contained total of 268 700 oz of gold. Mining of the 2.27 Mt of reserves, at an average grade of 2.81 g/t gold, will be by open pit over an estimated six-year period. The property is part of an earn-in agreement from New Island Resources Inc.

Voisey's Bay Nickel Company Limited spent over $500 million on infrastructure associated with mining of the Ovoid nickel-copper-cobalt deposit at Voisey's Bay. The production decision was announced in March 2003 and the first ore is scheduled to be produced by the end of 2005. Voisey's Bay Nickel Company Limited has initiated a program of exploration and deposit appraisal of the satellite nickel deposits surrounding the Ovoid.

Hurley Slate Works Company Inc. resumed slate production at its Trinity Bay operations in June 2004.

Trinity Resources & Energy Limited shipped bulk samples of pyrophyllite from its mine near Manuels, on the Avalon Peninsula, to Germany for testing.

Iron Ore Company of Canada and Wabush Mines continue to produce iron ore at the Luce mine and the Scully mine, respectively, in western Labrador. Major capital and infrastructure maintenance expenditures are invested in these operations annually.

Mining operations also continue at Lower Cove on the Port au Port Peninsula in western Newfoundland by Atlantic Minerals Limited for limestone and dolomite, at Finger Pond on Mount Peyton in central Newfoundland by International Granite Corporation for gabbro, and at Ten Mile Bay and Igiak Bay near Nain in Labrador by Torngait Ujaganniavingit Corporation for anorthosite.

Mining ceased at Richmont Mines Inc.'s Hammerdown gold mine on the Springdale Peninsula in northwest-central Newfoundland in May 2004. Mining commenced in July 2001 and approximately 143 000 oz of gold were produced during the mine life.

Development-Stage Projects

A major new iron ore development is proposed for western Labrador. At Howells River, near Schefferville, New Millenium Capital Corporation is conducting prefeasibility studies on a magnetite iron ore resource. The magnetite ore was first delineated by Iron Ore Company of Canada in the 1960s.

Economic and baseline environmental and archaeological studies were conducted in 2003 and in 2004. Additional prefeasibility engineering and marketing studies are ongoing. Recent diamond drilling indicates a resource of 600 Mt, enough to support an average production of 10 million tonnes per year (Mt/y) over a 20-year mine life for a return of over $10 billion.

On March 1, 2004, project operator VVC Exploration Corp. announced that Beaver Brook Antimony Mines Inc. had completed the acquisition of the Beaver Brook property from Beaver Brook Resources Limited for $17 million. The Beaver Brook property, located 40 km southeast of Grand Falls-Windsor in central Newfoundland, contains the Beaver Brook antimony deposit and includes infrastructure and underground development from a previous (1997-98) mining operation.

A study by MRB & Associates for the previous operator, Roycefield Resources Ltd., resulted in an all-categories resource of 1.943 Mt grading 4.32% antimony at a 2% antimony cut-off. Utilizing these figures, Watts, Griffis and McOuat conducted a scoping study in 2003 that looked at the mine, mill, supporting infrastructure, resources and market, and concluded, positively, that at an annual production rate of 157 000 t, the internal rate of return would be approximately 27%. Subsequently, improved economics indicate an estimated internal rate of return of 37%.

In 2004, VVC Exploration Corp. commenced in-fill diamond drilling on the Main zone mineralization as part of a feasibility study designed to upgrade the reserves and to assist in the preparation of a mine plan for the re-opening of the mine. A 13 000-m drilling program tested the continuity of the Main and Lower Main zones for resource estimate purposes and to further explore the West zone. Over 20 intersections of 1% to 8.39% antimony over widths of 1-5 m were reported, along with higher-grade intersections of 2.94% antimony over 17 m, 4.39% antimony over 8 m, and 30.24% antimony over 1.5 m.

2004 Exploration Highlights - Labrador

In 2004, Labrador experienced a resurgence in both nickel and uranium exploration. The former consists of exploration for nickel-copper-cobalt deposits similar to Voisey's Bay. The latter consists of exploration for iron oxide-copper-gold (IOCG) deposits, similar to the Olympic Dam style of mineralization in Australia. Properties are shown in **Figure 14**.

Voisey's Bay Nickel Company Limited spent approximately $3.7 million on exploration and deposit appraisal of the satellite deposits surrounding the Ovoid open-pit mine site. The exploration program included diamond drilling, surface and downhole geophysical surveys, and core lithogeochemistry.

Outside of the Voisey's Bay area, nickel exploration is led by Gallery Resources Limited and Altius Resources Inc. in western Labrador and by Cornerstone Resources Inc. at its new Konrad project west of Voisey's Bay.

At the 4320-claim Shabogamo project in the western Smallwood Reservoir area of western Labrador, Gallery Resources Limited may earn a 50% interest in the venture from BHP Billiton Diamonds Inc. by expending $1 million on exploration by late December 2006. An airborne electromagnetic geophysical survey was used to delineate targets for diamond drilling. A limited diamond-drilling program was completed in November 2004.

Altius Resources Inc.'s 1771-claim nickel-copper-cobalt Michikamau property is located in the northeastern area of the Smallwood Reservoir in western Labrador. Teck Cominco Limited has an option from Altius Resources Inc. whereby it may earn a 51% interest by spending $1.5 million over five years.

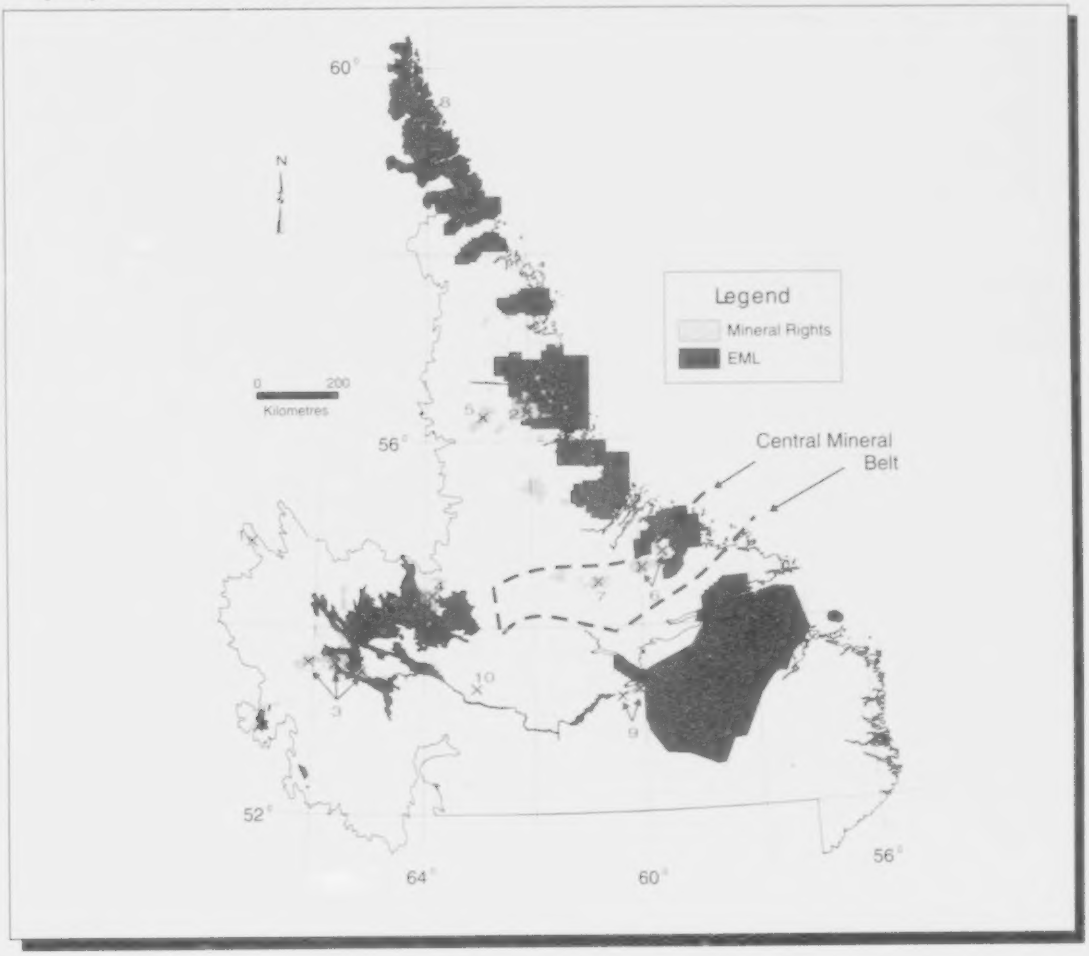
In September, Cornerstone Resources Inc. announced a "strategic alliance" with Falconbridge Limited to explore for Voisey's Bay-type nickel deposits within a 5900-km^2 area surrounding its Konrad property earn-in joint venture. The alliance covers a corridor extending from Inco Limited's Voisey's Bay property in the east to west of the Konrad property.

Labrador's Central Mineral Belt (**Figure 14**) is the main area of uranium exploration. The Central Mineral Belt was the location of uranium exploration in the 1970s and contains a number of known deposits; it is also prospective for rare earth elements, base metals (copper-lead-zinc) and, most recently, IOCG-type mineralization.

Altius Resources Inc. initiated an IOCG exploration project in the Central Mineral Belt in 2003. Since then the main focus has switched to uranium. The main property consists of 3485 claims and contains the Michelin and Post Hill uranium deposits; it is being explored in "strategic alliance" with Fronteer Development Group Inc. Altius Resources Inc. holds several small properties farther west.

Other uranium and IOCG exploration projects in the Central Mineral Belt are: Monster Copper Resources Inc.'s 1080-claim South Moran property, Crosshair Exploration & Mining Corp.'s 67-claim Moran Lake property option from Lewis Murphy, 621 claims in several properties held by Jens E. Hansen peripheral to the previous two properties, and Triassic Properties Ltd.'s 48-claim Bruce River property. In addition, in the centre of the main Altius Resources Inc. property is the 62-claim Mustang Lake property held by Monster Copper Resources Inc.

Figure 14
Property and Mineral Disposition Map for Labrador, 2004



Development-Stage Project

3. Howells River	New Millenium Capital Corporation

Exploration Properties

2. Voisey's Bay	Voisey's Bay Nickel Company Limited
3. Shabogamo	Gallery Resources Limited
4. Michikamau	Altius Resources Inc.
5. Konrad	Cornerstone Resources Inc.
6. Central Mineral Belt	Altius Resources Inc.
Mustang Lake	Monster Copper Resources Inc.
7. South Moran	Monster Copper Resources Inc.
Moran Lake	Crosshair Exploration & Mining Corp.
Central Mineral Belt	Jens E. Hansen
Bruce River	Triassic Properties Ltd.
8. Iron Strand	Freeport Resources Inc.
9. Churchill River	Markland Resource Development Inc.
10. Wilson Lake	Torngait Ujaganniavingit Corporation

Source: Newfoundland and Labrador Department of Natural Resources, Mineral Lands Division.
EML: Exempt Mineral Lands.

Exploration for nonmetal commodities in Labrador includes Freeport Resources Inc. for garnet- and titanium-bearing beach sands in northernmost Labrador; Markland Resource Development Inc. for titanium/iron oxides, garnet and zircon in estuarine and terraced sands near Goose Bay in central Labrador; and Torngait Ujaganniavingit Corporation for feldspar in central Labrador.

2004 Exploration Highlights - Newfoundland

Exploration on the Island of Newfoundland during 2004 was focused on gold and base metals. Most gold exploration is for quartz-vein-hosted, mesothermal and/or orogenic styles of mineralization, followed by vein-hosted epithermal and Carlin-type mineralization. Base-metal exploration is almost exclusively for volcanogenic massive sulphides (VMS). Properties are shown in **Figure 15**.

Gold exploration is concentrated in central Newfoundland and is led by Rubicon Minerals Corporation, Cornerstone Resources Inc., Altius Resources Inc. and Crosshair Exploration & Mining Corp.

In late December 2003, Rubicon Minerals Corporation completed Phase 1 of a diamond-drilling program on the Golden Promise gold property. The property is located in central Newfoundland and has been joint ventured to Placer Dome Canada Ltd., which may earn a 55% interest by expending $5 million over four years, including $1.5 million by the end of 2004.

At the Valentine Lake gold property in west-central Newfoundland, Richmont Mines Inc. completed a due diligence study, including diamond drilling, in the winter of 2004 as part of an agreement with Mountain Lake Resources Inc. The spending involved satisfied the latter's work requirements under an earlier option for a 100% interest from Noranda Inc. Richmont Mines Inc. may earn a 70% interest in the property from Mountain Lake Resources Inc. by spending a further $2.35 million by the end of October 2007.

In December 2004, Richmont Mines Inc. reported a new inferred resource calculation, based on 6965 m of diamond drilling in 24 holes, of 1.3 Mt grading 10.5 g/t gold. When the high-grade (>58 g/t) assays are cut, the average grade is 8.51 g/t gold for a yield of approximately 359 000 oz of gold. Expenditures for the three-phase diamond-drilling program approximated $1 million.

Cornerstone Resources Inc. also has a joint venture with Thundermin Resources Inc. at its 1375- claim Cape Ray gold project. The Cape Ray property extends for almost 120 km in a generally east-northeasterly direction along the Cape Ray fault zone, from near Port-aux-Basques to King George IV Lake, and contains the 51 Zone deposit and the Windowglass Hill gold prospect.

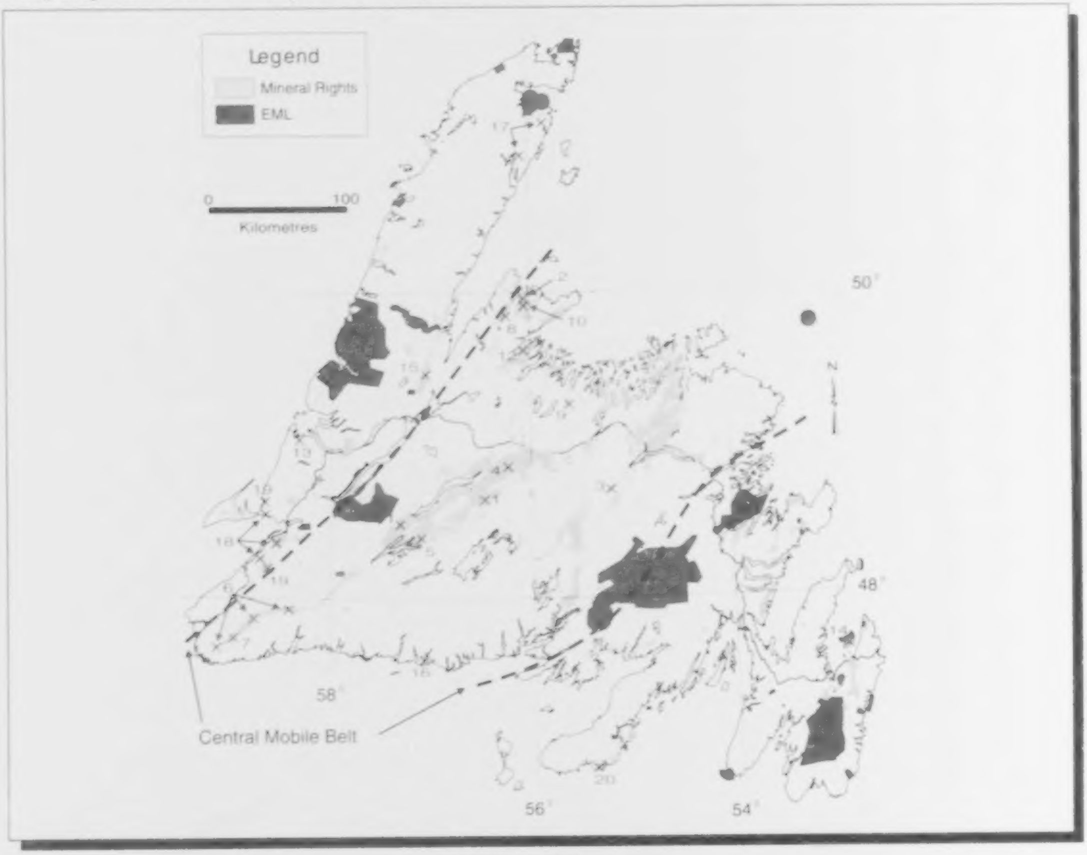
Terra Nova Gold Corp. completed diamond-drilling programs on the 46-claim cluster of four properties at its Cape Ray gold project. The four properties contain the 04, 41 Zone, and Isle aux Morts deposits. The best results from diamond drilling of the 04 deposit consisted of 7.95 m of 10.1 g/t gold, 1.83 m of 19.28 g/t gold, and 3.06 m of 32.35 g/t gold, which included 1.53 m of 53 g/t gold.

Anaconda Gold Corp. optioned the 277-claim Dorset gold property, on the Baie Verte Peninsula, from South Coast Ventures Inc. Anaconda Gold Corp. may earn a 100% interest by spending $1.25 million over four years. The property is contiguous to the southwest of the Pine Cove gold deposit.

Base-metal exploration in Newfoundland is primarily located in and around west-central Newfoundland (**Figure 15**).

At the Point Leamington deposit in north-central Newfoundland, TLC Ventures Corp. is conducting diamond drilling and down-hole geophysical surveys as part of prefeasibility studies on the deposit. In the centre of the 80-claim property, TLC Ventures Corp. has an option to acquire a 100% interest in the 263-hectare (ha) mining lease that contains the deposit from Rubicon.

Figure 15
Property and Mineral Disposition Map for the Island of Newfoundland, 2004



Future Mines

1.	Duck Pond	Aur Resources Inc.
2.	Pine Cove	Anaconda Gold Corp.

Development-Stage Project

3.	Beaver Brook	VVC Exploration Corp.

Exploration Properties

4.	Golden Promise	Rubicon Minerals Corporation
5.	Valentine Lake	Richmont Mines Inc.
6.	Cape Ray	Cornerstone Resources Inc.
7.	Cape Ray	Terra Nova Gold Corp.
8.	Dorset	Anaconda Gold Corp.
9.	Point Leamington	TLC Ventures Corp.
10.	Rambler North	Altius Resources Inc.
11.	Tulks East	Messina Minerals Inc.
12.	Colchester	Cornerstone Resources Inc.
13.	York Harbour	Wolfden Resources Inc.
14.	Bell Island	Provincial Energy Ventures Ltd. (LLC)
15.	Rocky Brook	Altius Resources Inc.
16.	Grey River	Playfair Mining Ltd.
17.	Canada Bay	Omya (Canada) Inc.
18.	Bay St. George	Corner Brook Pulp & Paper Limited
19.	Robinsons River	Fenton Scott
20.	St. Lawrence	Burin Minerals Ltd.

Source: Newfoundland and Labrador Department of Natural Resources, Mineral Lands Division.
EML: Exempt Mineral Lands.

In March 2004, TLC Ventures Corp. reported a new mineral resource estimate by Hatch Associates Limited. Hatch Associates Limited calculated an inferred resource of 12.3 Mt grading 1.92% zinc, 0.88 g/t gold, 0.28% copper and 16.94 g/t silver and containing 520 million lb of zinc and 348 000 oz of gold at a 1% zinc cut-off, together with 1.6 Mt grading 4.16% zinc, 1.54 g/t gold, 0.23% copper and 31.26 g/t silver at a 3% zinc cut-off. The mineralization is open along strike and at depth.

Altius Resources Inc. completed two diamond drillholes at its 66-claim Rambler North copper-gold property on the Baie Verte Peninsula. The diamond-drilling program tested the Footwall zone to the Ming massive-sulphide horizon near the former Ming mine and is funded through a six-month option to a venture capital group from the United Kingdom.

On September 7, Altius Resources Inc. reported results from a diamond-drilling program at the Rambler North property. Two diamond drillholes tested the Ming Footwall zone, a volcanogenic massive sulphide stringer zone beneath and subparallel to the Ming massive sulphide deposit. The Ming Footwall zone is open along strike, to both the north and south, and down plunge.

Messina Minerals Inc. completed diamond-drilling programs at the Tulks East, 228 Gold, Boomerang, Curve Pond and Eagle zones on its Tulks South base-metal property in west-central Newfoundland. Messina Minerals Inc. has an earn-in option from Noranda Inc. for a 100% interest in this property.

The Boomerang prospect is a new discovery containing an intersection of 14.6 m of massive sulphide (estimated true thickness of 9.6 m). The lower 13.9 m of this intersection graded 13.6% zinc, 4% lead, 0.7% copper and 102 g/t silver, of which the bottom 4.7 m assayed 20.1% zinc, 5.2% lead, 0.6% copper and 138 g/t silver. This area also returned anomalous gold in grab samples.

Cornerstone Resources Inc. operates the Colchester base-metal/gold property under an option with Sudbury Contact Mines Limited on the Springdale Peninsula, Notre Dame Bay. Mapping, prospecting and diamond drilling were completed followed by a deep-penetrating ground geophysical survey. The diamond drilling tested gold-rich massive sulphide localities and included 2.97% copper and 0.5 g/t gold over 5.6 m and 1.22% copper over 8.9 m.

In February, Wolfden Resources Inc. announced an option to acquire a 100% interest in the 26-claim York Harbour base-metal property in western Newfoundland from South Coast Ventures Inc. by spending $2 million over four years.

In August 2004, the Department of Natural Resources issued a "call for proposals" relating to potential development of surface stockpiles within the Exempt Mineral Lands on Bell Island on the Avalon Peninsula. Provincial Energy Ventures Ltd. (LLC) of Pennsylvania was awarded the mineral rights and to date has completed a sampling program of all surface stockpiles. Testing is ongoing.

Most exploration for nonmetals in Newfoundland is located in the west of the island.

On Altius Resources Inc.'s Rocky Brook uranium property, located south of White Bay in western Newfoundland, till analyses of the core from a fall 2003, 96-hole sonic-drilling program outlined a uranium anomaly in an area with no prior diamond drilling. Down-ice from the anomaly is an area of unsourced boulders that have returned up to 11.5% U_3O_8, 29 448 g/t silver and 17.8 g/t gold. Cameco Corporation has withdrawn from its option on the property, having funded $660 000 of exploration over the last two years.

In October, Playfair Mining Ltd. announced an agreement to purchase a 100% interest in the 74-claim Grey River tungsten property in southern Newfoundland from South Coast Ventures Inc.

Other nonmetals exploration in Newfoundland includes: Omya (Canada) Inc. for marble on the Great Northern Peninsula; Corner Brook Pulp and Paper for gypsum, and Fenton Scott for salt, gypsum, coal, methane and heavy mineral sands, all in western Newfoundland; and Burin Minerals Ltd. at St. Lawrence for fluorspar.

Government Incentives

Government incentive programs supporting junior exploration companies and prospectors remain. However, in this first year of a three-year program, the amount of funds available under Junior Exploration Assistance (JEA) is down approximately 35% to $1.37 million. (Funds available in the original five-year program were approximately $2.2 million per annum.) Funding for Prospectors Assistance, at $250 000, remains the same. In addition, the former Dimension Stone Incentive program has been assimilated into JEA.

Legislative Changes

In the spring of 2004, the Mineral Lands Division of the Department of Natural Resources began the process of converting any remaining ground-staked claims to map-staked claims. This operation was completed in July.

Aboriginal Issues

In April, the Conne River Micmac native reserve was increased in size.

2.3 NOVA SCOTIA[8]

Overview

Exploration activities in Nova Scotia have increased significantly in 2003 and 2004, as they have in most jurisdictions in Canada. Gold has been the chief focus of exploration, while several projects have been directed at a variety of industrial mineral commodities and, to a lesser extent, base metals.

Much of the gold exploration activity has targeted low-grade, bulk-mineable, disseminated gold deposits and high-grade, lode-gold veins in the Meguma Group rocks of southern Nova Scotia. Other gold projects focused on the potential for iron oxide-copper-gold (IOCG) deposits along the Cobequid-Chedabucto fault zone in central Nova Scotia.

Exploration expenditures in Nova Scotia are forecast to be $6.5 million for 2004 (**Table 12**), up more than 100% from the $3.2 million spent on exploration in 2003. In contrast to the increased expenditures, the total area under exploration licence in Nova Scotia, including new and re-issued claims and special licences, has decreased from 17 837 claims in 2003 to 9574 claims in 2004. This reduction is largely due to companies eliminating areas of low potential based on results from preliminary exploration activities. Total exploration drilling for 2004 is forecast to be 17 500 m, up substantially from the 12 200 m of drilling in 2003.

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[8] The Nova Scotia review of activities was prepared by Michael McDonald. For more information, the reader is invited to contact Mr. McDonald by telephone at (902) 424-2523 or by e-mail at mamacdon@gov.ns.ca.

TABLE 12. NOVA SCOTIA MINERAL EXPLORATION STATISTICS, 1997-2004

	1997	1998	1999	2000	2001	2002	2003 (p)	2004 (f)
Exploration expenditures (field + overhead) ($)	6 726 000	4 835 000	3 800 000	3 500 000	2 900 000	2 000 000	3 200 000	6 500 000
Claim staking (new and reissued) (general + special licences) (no. of claims)	25 190	11 452	14 045	10 951	8 406	12 494	17 837	9 574
Exploration diamond drilling (metres)	26 487	20 297	16 860	8 200	5 470	3 540	12 200	17 500

Source: Nova Scotia Department of Natural Resources.
(f) Forecast, (p) Preliminary.

Mining

Black Bull Resources Ltd. has been exploring and developing its White Rock property near Yarmouth since 1997. In April 2004, the company received the final permits authorizing the development of a quartz mine and shortly thereafter commenced development work. The company has defined a high-quality quartz (silica) deposit with total measured plus indicated resources of 12.2 million tonnes (Mt) grading 97.4% SiO_2 and an additional inferred resource of 7.3 Mt. This represents one of the largest white quartz deposits in eastern North America. Black Bull has also reported that the ore can be upgraded to 99.5% SiO_2 by flotation processing, which could allow for additional value-added applications. Black Bull has signed an exclusive marketing and sales agreement for its quartz product with U.S. Silica Company. U.S. Silica has more than a century of experience in the quartz business and has annual sales in excess of 6 Mt.

L'Ardoisiere, a Québec-based stone-processing company, began quarrying operations at its slate deposit near Gore in central Nova Scotia in June 2004. The company is currently exporting stone to its processing plant in Quebec.

MacLeod Resources Limited completed test processing and market development, and began exporting dark red and blue-gray marble from the company quarry in River Denys, Cape Breton Island. Most of the stone is currently shipped via container through the port of Halifax to processing facilities in Italy, with subsequent distribution to markets in Europe and North America.

Development-Stage Projects

Pioneer Coal Company has come to an agreement with the town of Stellarton regarding the extension of its surface coal mine and is in the process of acquiring the necessary permits. The company continues to employ its NovaMiner 2000 at the site. This proprietary technology allows Pioneer to mine coal seams with up to a 26° dip. Pioneer plans to access approximately 1 Mt of additional coal from four seams, which will extend its mine life by approximately six years.

Following the surrender of Devco leases on Cape Breton Island, the Nova Scotia government commenced a tendering process for the development of coal deposits. In May 2004, the province announced it had accepted proposals from three companies to explore, develop and reclaim four claim blocks in the Sydney coalfield. The successful companies are Thomas Brogan and Sons Construction Company, Coastal Construction and Excavating Limited, and Pioneer Coal Limited.

At the time this report was prepared, the provincial government was working towards preparing a tender for the mineral rights to the Donkin Coal Resource Block, the final major submarine coal deposit in the Sydney coalfield. The total coal resource (inferred, indicated and measured) is estimated at 1400 Mt for the three primary coal seams. This potential project could provide a significant amount of coal for both domestic and export markets. Information for the tender is available at www.gov.ns.ca/natr/meb/donkin.

Exploration Highlights

Gold - Southern Nova Scotia

Diamond Ventures NL, an Australian-based company, continued to evaluate the open-pit potential of the Touquoy deposit, a sediment-hosted, disseminated gold deposit at Moose River. On July 12, 2004, the company reported a combined mineral resource estimate for the Touquoy and Touquoy West (formerly Higgins and Lawlor and Stillwater) deposits. Indicated and inferred resources for the deposits included 6.91 Mt grading 2.1 g/t gold (472 000 oz) and 1.52 Mt grading 2.0 g/t gold (99 000 oz) for the Touquoy and Touquoy West deposits, respectively. The company recently completed a reconnaissance percussion drilling program to evaluate the 17-km length of the broader Touquoy property. The program comprised 313 drillholes. Diamond Ventures has announced plans to conduct a delineation diamond-drilling program of known resources on 20 m x 25 m centres to establish measured and indicated resources for a bankable feasibility study.

Acadian Gold Corporation has extensive holdings throughout the Meguma Terrane of southern Nova Scotia and is concentrating on four 100%-controlled advanced gold projects: Forest Hill, Tangier, Beaver Dam and Goldenville. The company continues to conduct diamond-drilling programs at these properties with drillholes being targeted to define shallow-plunging, multiple stacked gold mineralized shoots, which Acadian Gold terms "ribbons." The company is promoting the similarities between Nova Scotia gold deposits and the prolific belt in the Bendigo-Ballarat region of Australia, and plans to apply the Australian "Ribbon Model" to its Nova Scotia deposits. On October 5, 2004, the company reported an inferred resource estimate for the Forest Hill deposit of 300 501 oz of gold (grade of 11.8 g/t gold), and a resource estimate for the Tangier deposit that comprised an indicated resource of 51 804 oz of gold (grade of 5.48 g/t gold) and an inferred resource of 167 370 oz of gold (grade of 5.79 g/t gold).

Scorpio Mining Corporation recently obtained an independent mineral resource estimate for the Cochrane Hill gold deposit. The company reported a total indicated resource of 588 794 tons grading 0.191 oz/ton for a total of 112 460 contained oz of gold projected to a depth of 175 feet.

Azure Resources Corp. continued to evaluate the economic potential of high-grade gold veins at the Mooseland and nearby Dufferin deposits. The company completed a six-hole program in August 2004 that established the continuity of a fourth saddle vein along a strike length of 350 m and advanced its decline to the fourth saddle where it conducted bulk sampling activities.

Orex Exploration Inc. continued to evaluate gold mineralization at its Goldboro property. The company is planning a drilling program designed to twin previous drillholes containing intersections of coarse free gold, but which yielded low gold levels overall.

Gold - Northern Nova Scotia

Joint-venture partners Monster Copper Corporation and Wallbridge Mining Company continued to evaluate their claims in central Nova Scotia. The claim blocks are situated near the Cobequid-Chedabucto fault zone, a major regional fault zone that hosts copper, cobalt and gold occurrences with IOCG attributes, commonly referred to as "Olympic Dam"-style deposits. Sampling and analysis confirmed reported results of copper-gold mineralization associated with high-iron breccias. The companies completed a drill program at their Copper Lake property, based on the results of geophysical and geochemical surveys, and are also conducting exploration, focused on seven targets, at their Copper Lake, Lansdowne, North Ogden and Bass River properties.

Avalon Ventures Ltd. is exploring for IOCG deposits in the Mount Thom area. The company completed a first phase of drilling in August 2004 and reported encouraging assay results from drill core, including 3.0-m intervals from two drillholes that averaged 1.01% copper and 0.093% cobalt, and 1.13% copper and 0.042% cobalt, respectively. On October 27, 2004, the company announced it had commenced a Crone Pulse electromagnetic (EM) geophysical survey centred on a large magnetic anomaly. Previous drilling of this anomaly revealed a mafic intrusion with geochemically anomalous levels of nickel, copper and cobalt.

Joint-venture partners Mountain Lake Resources Inc. and Mt. Cameron Minerals Inc. conducted an 11-hole diamond-drilling program on their Frenchvale property. The companies are exploring for nickel-copper-platinum group elements (PGE) and gold targets, which occur as discrete magnetic or electro-magnetic anomalies aligned along a 13-km linear trend on the property. Coloured corundum crystals in marble skarn were discovered during field mapping. Initial evaluation of the corundum indicates that the samples examined are not of gem quality.

2.4 NEW BRUNSWICK[9]

Exploration Highlights

In 2004, the New Brunswick exploration sector experienced activity levels that were well above those that occurred in the past two years. It is anticipated that exploration expenditures for New Brunswick in 2004 will be more than $8 million (current dollars), representing a 200% increase over 2003. **Figure 16** shows exploration trends as expressed by monies spent on exploration projects in New Brunswick over the past 15 years.

During the latter part of 2003, a surge in mineral claim staking was experienced in northern New Brunswick. This activity continued on into 2004 and resulted in over 6400 claims being recorded in the province, a 15-year record high. In 2004, 6426 claims were recorded in comparison to the 2936 claims that were registered in 2003, a 119% increase.

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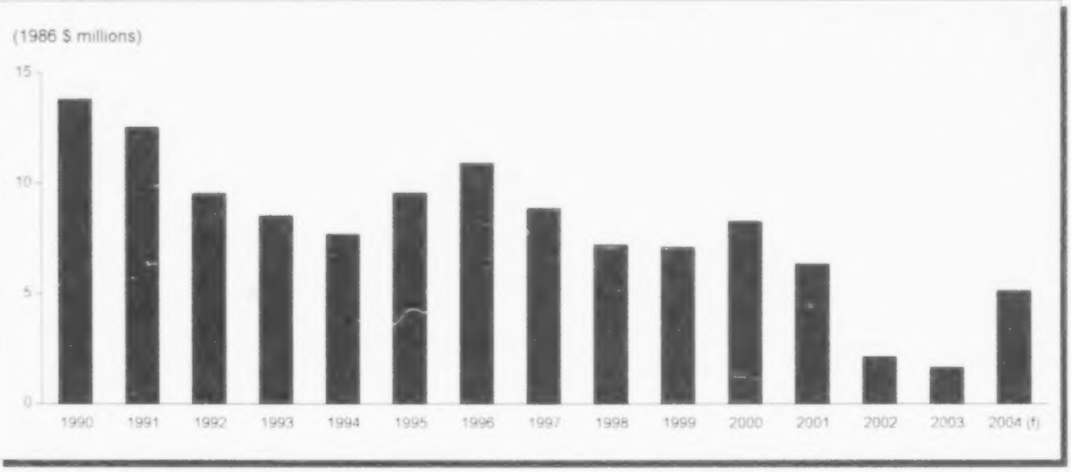
[9] The New Brunswick review of activities was prepared by Don J.J. Carroll. For more information, the reader is invited to contact Mr. Carroll by telephone at (506) 453-2206 or by e-mail at Don.Carroll@gnb.ca.

Figure 16
Mineral Exploration Expenditures in New Brunswick, 1990-2004



Source: New Brunswick Department of Natural Resources
(f) Forecast of intentions
Note: General plus mine-site expenditures (includes overhead costs)

Metallic Minerals

Northern New Brunswick

Exploration expenditures in the northern half of the province for 2004 were more than $6 million, a tenfold increase over the previous year. At the end of 2004, the number of new claims recorded in northern New Brunswick was 5609, more than two times the number at the corresponding time in 2003 (2508). In addition, two exploration permits totaling 4938 claim equivalents were granted. The number of claims in effect in the northern New Brunswick was approximately 14 400.

Noranda Inc. was the only major mining company that was active in northern New Brunswick in 2004; its activities were related to a joint-venture project with Slam Exploration Ltd. in the Bathurst mining camp. Breakwater Resources Ltd., and its subsidiary CanZinco Ltd., still hold a significant land position in northern New Brunswick and conducted limited exploration during the year.

Apart from Slam Exploration, the junior exploration companies that collectively spent approximately $1 million in the region include Acadian Gold Corporation, Aurogin Resources Ltd., Eastmain Resources Inc., First Narrows Resources Corporation, Montoro Resources Inc., Puma Exploration Inc. and Stratabound Minerals Corp. All of these companies took advantage of the New Brunswick Junior Mining Assistance Program (NBJMAP). Other juniors, such as Commander Resources Ltd., Forest Gate Resources Inc., Freewest Resources Canada Inc., Heron Mines Ltd., Mountain Lake Resources Inc., PGE Resource Corporation, Royal Roads Corporation and VenCanGold Corporation, held ground but did little or no work on their claims during the year.

During the winter of 2004, Noranda Inc. and Slam Exploration Ltd., a junior mining company based in Miramichi, carried out the first phase of their five-year Bathurst Joint Venture (BJV), which consisted of about 22 400 line-kilometres of airborne electromagnetics (MegaTEM) and 15 200 line-kilometres of airborne FTG (Full Tensor Gravity). Over 300 MegaTEM anomalies were identified for ground follow-up, which began in the spring. By late October, 38 targets had been drill-tested at depths ranging between 50 m and 150 m but no economic-grade mineralization was intersected in any of the holes. However, drilling continues and the program calls for up to 28 000 m of drilling by the end of the fiscal year. The Bathurst Joint Venture includes 6309 mineral claims and 4938 claim equivalents, which cover over 182 000 hectares (ha) of highly prospective volcanic and sedimentary rocks in the Bathurst mining camp.

Slam Exploration Ltd. also carried out exploration, independent of the Bathurst Joint Venture, on its Nash Creek property located 45 km northwest of Bathurst. Approximately 272 line-kilometres of MegaTEM and 157 line-kilometres of FTG were flown. Follow-up drilling of anomalies began in the fall and results from the first three holes were reported in December.

Breakwater Resources Ltd. and its wholly owned subsidiary CanZinco Ltd. announced (in a press release dated October 8, 2004) that a letter of intent had been signed to sell its Caribou and Restigouche mines to Blue Note Metals Inc., a wholly owned subsidiary of Forest Gate Resources Inc. Earlier in the year, Breakwater drilled three short holes on satellite properties to its Caribou mine but no results were reported. It also entered into an agreement with BIOTEQ Environmental Technologies Inc. for mine dewatering and water treatment services at Caribou and Restigouche, as well as general site management.

During the early summer, Eastmain Resources Inc. conducted a five-hole, 1300-m drilling program on its CNE property, under option from Stratabound Minerals Corp. The holes were collared to test IP (induced polarization) geophysical targets on various parts of the property. No results were reported.

First Narrows Resources Corp. reported results from a five-hole drilling campaign, totaling about 500 m, on its Middle River gold property located approximately 18 km west of Bathurst. In

November, it announced that drilling would begin on the Western Deeps Extension of the Chester copper deposit, which is under option from Teck-Cominco Limited, and that 665 line-kilometres of helicopter-borne VTEM (Versa Transient Electromagnetic) surveying had been completed on adjacent claims to the northwest to better delineate MegaTEM anomalies. In December, First Narrows announced that two drillholes had intersected a new sulfide zone on a MegaTEM anomaly. Assay results are pending.

Early in the year, Acadian Gold Corporation drilled 11 shallow holes near the Noel-Willett gold discovery (2003), which yielded grab samples that graded up to 49 g/t gold from silicified breccia in the Tetagouche Falls area about 12 km west of Bathurst. The drilling showed that the mineralized zone trends northwesterly across the tectonic fabric and is probably intrusion-related, although no intrusive rocks were encountered. Additional drilling on the property began in the late fall but no results were reported before year-end.

Aurogin Resources Ltd. was planning to conduct an airborne survey (electromagnetic and magnetic) in the Rocky Brook-Millstream area, northwest of Bathurst, before the end of 2004. The purpose of this survey is to delineate structures and intrusions in the vicinity of the Nicolas Denys Granodiorite, which could host gold mineralization. However, at the time of writing this review, the survey had not begun. A local prospector, Merton Stewart, assayed a quartz boulder from the contact aureole of this intrusion that yielded bonanza-grade gold (over 2500 g/t).

Early in 2004, Montoro Resources Inc. drilled nine shallow holes to test copper-cobalt mineralization on its Malachite property located 60 km west of Bathurst.

Stratabound Minerals Corp. conducted an IP survey on its Ramsay Brook gold property located 75 km west of Bathurst. Late in the year, the company also carried out a trenching and sampling program at its Elmtree gold property located 19 km northwest of Bathurst.

Puma Exploration Inc., a subsidiary of Ressources Appalaches Inc., drilled four shallow holes on its Big Pit gold property located about 75 km west of Bathurst.

Southern New Brunswick

In comparison to 2003, the land position for mineral rights in southern New Brunswick more or less remained the same. Despite registering, at the end of 2004, a percentage gain (90%) in claim recordings similar to that of northern New Brunswick and lower claim expiries (916) than the previous year, southern New Brunswick ended up with a net claims in effect total of 3504, a 3% decrease from 2003 (3603).

During 2004, the main focus of exploration programs conducted by junior mining companies and prospectors in southern New Brunswick was on gold and nickel-cobalt-copper. Exploration activities for gold concentrated on specific geological settings, including intrusion-related and structurally related environments throughout the region. The investigations for nickel-cobalt-copper were associated with a Silurian mafic to ultramafic intrusion located in the St. Stephen area. The main intrusion-related gold systems investigated, which are mostly associated with Siluro-Devonian felsic intrusions, include those in the vicinity of Clarence Stream northeast of St. Stephen and in the Poplar Mountain area west of Fredericton. Structurally related gold environments explored included deposits formed within an extensive, Late Carboniferous to Permian, northeast-trending thrust/fold belt in the Cape Spencer area south of Saint John, and within a newly recognized gold-bearing environment associated with the late (possibly mid) Carboniferous, north and northwest-trending fault zones in the Oak Bay and Pokiok areas, east of St. Stephen and west of Fredericton, respectively.

In 2004, tangible evidence for the presence of auriferous, high-sulphidation systems was found for the first time in Neoproterozoic rocks of the Caledonia Belt, south of Sussex. Although this occurrence has not been fully evaluated to date and may not be economic, the presence of numerous occurrences and economic deposits of this type in broadly similar Neproterozoic rocks elsewhere (e.g., Newfoundland and South Carolina) highlights the importance of this discovery and the gold potential of the Caledonia Belt in general.

GOLD EXPLORATION IN INTRUSION-RELATED ENVIRONMENTS

Freewest Resources Canada Inc. continued its exploration efforts in the Clarence Stream area, where a total mineral inventory of 252 395 ounces (oz) of gold has been established to date. As the result of a 19-hole drilling program to further test the potential in the Anomaly A group of deposits on the northern part of the property, the proposed continuity between the AD and MW zones along a shallow folded thrust structure was verified. Furthermore, it was also established that the 93 zone to the south is controlled by the same first-order structure. Many ore shoots in the Anomaly A area and elsewhere on the property remain open at depth and along strike, indicating excellent potential for sizeable, medium- to high-grade, economic gold deposits.

Several other junior mining companies and local prospectors were also active in the Clarence Stream area during 2004. These included: Union Gold Inc., Murgor Resources Inc., Fancamp Exploration Ltd., William Gardiner, D.V. Venugopal, Ken Whaley, Dave Stevens, David O'Neill, Kim Reeder, Reg Cox and Peter Fenety. On a property southwest of Freewest's group of claims, a five-hole drill program by Union Gold Inc. on its McBirney Lake claims intersected favourable geology but low gold values. Sampling by Dave Stevens on his Lily Hill property returned up to 18.6 g/t gold from sub-outcrop. To the northeast of Freewest's property, an extensive geophysical/geochemical survey by Murgor Resources Inc. delineated new targets while trenching by Ken Whaley on a new claim group near Back Clarendon, further along strike, yielded several high grab samples of up to 19.46 g/t gold.

First Narrows Resources Corp., after an option agreement with Freewest Resources Canada Ltd., drilled nine holes on the Golden Ridge property in the vicinity of Poplar Mountain. This work represents a continuation of the investigation of this extensive, volcanic-hosted alteration zone with high potential for a very large, low-grade type of intrusion-related deposit. Significantly, gold mineralization was also discovered this year in Ordovician metasedimentary rocks that surround the volcanic complex, indicating that potentially economic gold mineralization is likely much more widespread than anticipated.

GOLD EXPLORATION IN STRUCTURALLY RELATED ENVIRONMENTS

In the Cape Spencer area of southern New Brunswick, Geodex Minerals Ltd. conducted extensive geochemical and geophysical surveys, trenching and a 25-hole drilling program on new and several previously recognized mineralized zones associated with east- and northeast-trending strike-slip and thrust faults. This work, conducted on its Armstrong Brook property, which includes the Cape Spencer open-pit gold mine (past producer), provided encouraging results. Of particular interest was the recognition of a silica cap with high-grade feeder veins at the open pit that is very similar to a very large silica zone north of this locality that has yet to be tested by drilling.

In the Oak Bay area, Freewest Resources Canada Ltd., on a property optioned from prospector Kim Reeder, discovered the significance of the late north- and northwest-trending faults and associated alteration zones in the area after conducting a 2004 trenching program. Prior to trenching, numerous mineralized float samples were discovered yielding up to 17.49 g/t gold. Trenching revealed gabbroic intrusions and associated alteration zones that locally returned comparable grades.

Further evidence for significant mineralization along these structural trends was also found farther north on the Pokiok property, held by Darryl Marr, where quartz/carbonate vein systems returned numerous high values of up to 4.53 g/t gold with significant silver. Vein systems and locally well-developed, pervasive alteration occur over an area in excess of 600-m wide and appear to follow the associated fault zone for a distance of about 4 km.

Prospectors William Carter and Cyril Beaman continued evaluating the gold and copper potential of the Marrtown area, north of Sussex, where high-grade gold was previously discovered, again associated with north- and northwest-trending faults. Geochemical surveys have further refined targets for future work in this area.

EXPLORATION FOR GOLD AND NICKEL-COBALT-COPPER ENVIRONMENTS

In addition to the Armstrong Brook property, Geodex Minerals Ltd. has acquired substantial holdings elsewhere in southern New Brunswick. Of note is its option on the Chambers Settlement property from prospector Douglas Stewart that covers the newly recognized high-sulphidation system discussed above. Initial sampling has returned highly anomalous gold values from within an extensive alteration and quartz-veined zone that is several tens of metres wide and extends at least 2 km along strike. Geodex has also staked portions of the metal-rich Annidale Belt, north of Sussex, that hosts numerous high-grade gold showings associated with terrane-bounding, northeast-trending structures. In addition, the company has acquired the Sisson Brook property, north of Fredericton, that hosts extensive zones of polymetallic mineralization (tungsten, molybdenum, silver, base-metal sulphides and gold) and is apparently related to nearby felsic intrusions of Devonian age.

Renewed interest in nickel resulted in Abitex Resources Inc. acquiring the St. Stephen nickel-cobalt-copper property immediately north of St. Stephen. The company conducted a detailed, deep-penetrating VTEM survey and metallurgical testing utilizing bacterial leach during the year. Strong conductors over known bodies and several new targets were delineated by the geophysical survey, and leaching tests were very positive resulting in 99% nickel and cobalt recovery and about 60% recovery for copper on typical ore-grade material.

Outlook

In 2005, New Brunswick should see exploration activity on par with 2004 levels.

Mining Highlights (2003)

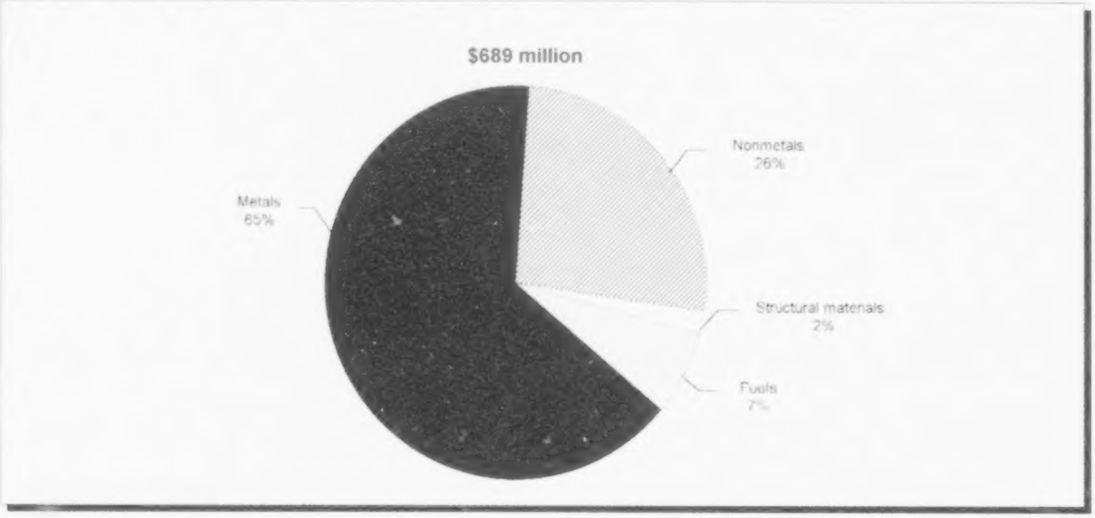
Value of Production

The 2003 value of mineral production (including coal) in New Brunswick is estimated to be $688 953 140, representing an increase of 5% over the final value of $653 479 214 in 2002 (**Figure 17**). The increase was due to a jump in the value of the nonmetals sector (particularly potash), the production of which was substantially higher than in the previous year. The value of the Canadian dollar, at US71.58¢, was almost 12% higher than in 2002 when it averaged US64.03¢. The strengthening of the currency offset a rising trend in metal prices.

The value of metals production during the year was $441 284 526, practically unchanged from 2002. The metals sector represents 64% of the province's value of mineral production (**Figure 18**). CanZinco's Caribou mine remained shut down for the fifth full year after low metal prices and metallurgical difficulties had forced a suspension of operations in August 1998. Noranda's Brunswick mine, New Brunswick's sole metals producer, set records for lead and zinc production.

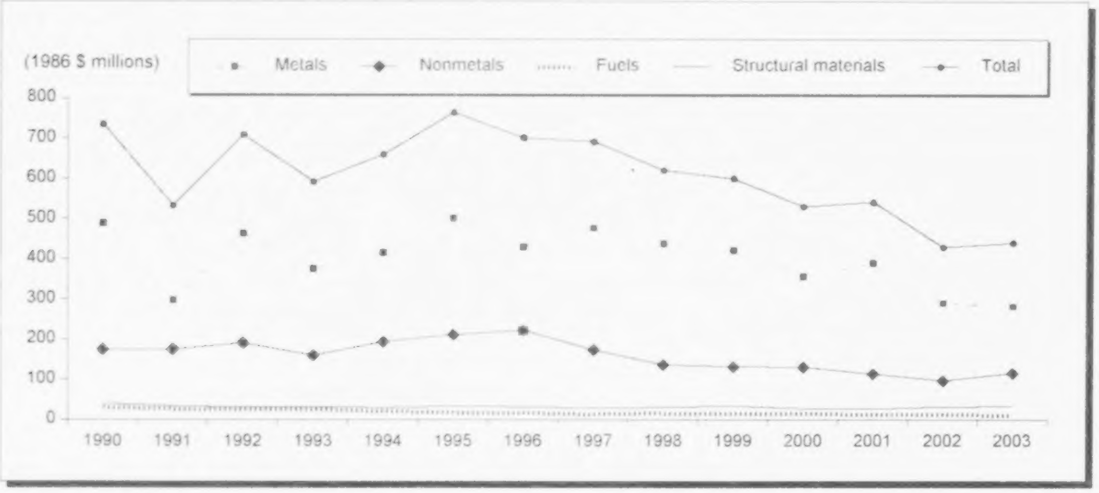
As always, zinc continued to dominate the metals sector, with a value of $318 872 217, representing 72% of the total value of metals. The value of zinc production increased by approximately 2% from 2002. The average zinc price increased by 6% between 2002 (US35.3¢/lb) and 2003 (US37.5¢/lb), but the appreciation of the Canadian dollar was a significant offsetting factor. Lead production was almost unchanged, but the price increased by almost 14% (US23.4¢/lb, up from US20.5¢/lb in 2002). Copper production was higher by 6% for a total value of $23 240 953. Copper value was boosted by a price increase of 14% (80.7¢/lb in 2003 versus 70.7¢/lb in 2002). Antimony, bismuth and cadmium continued to be produced as by-products from the Brunswick operation. For the second consecutive year, the total value of the three by-product metals decreased (by almost 30%).

Figure 17
New Brunswick Mineral Production Value, 2003



Source: New Brunswick Department of Natural Resources.

Figure 18
New Brunswick Mineral Production Values, 1990-2003



Source: New Brunswick Department of Natural Resources.

As in 2002, the decrease was mainly due to a substantial decline in bismuth production. A small drop in the amount of gold produced was more than offset by a 17% increase in price. Silver production was unchanged, but the value increased on the strength of a higher (5%) price.

The nonmetals sector of the industry contributed $180 562 227 (26%) to the value of mineral production, a 24% increase over the revised 2002 value. The largest contributor to the value of nonmetals production is potash. Both the value and quantity of potash increased from 2002 levels. Peat, the second largest contributor ($48 050 016) to the value of nonmetals production, represented 27% of the sector's value. The quantity and value of peat produced were lower than the 2002 revised values. Salt and sulphur in smelter gas ranked next in value of production, with quartz and marl being minor contributors to the nonmetals sector.

The value of coal produced by N.B. Coal Limited in the Minto-Chipman area was lower by 14% ($17 083 000) as production fell by 19%.

The value of production for structural materials (lime, stone, sand and gravel) increased by 6% to $50 023 387. Sand and gravel production was up 17% while stone production increased by 7%. These commodities provide the raw materials for the construction industry in New Brunswick.

Provincial Exploration and Development Initiatives

As part of New Brunswick's efforts to stimulate exploration activity, the Department of Natural Resources introduced the New Brunswick Junior Mining Assistance Program and the New Brunswick Prospector Development Program in fiscal year 2001/02. These three-year programs have an annual budget of $600 000.

New Brunswick Junior Mining Assistance Program (NBJMAP)

The main objective of the program is to provide financial assistance to junior mining companies in order to increase the probability of finding economic reserves of mineral resources in New Brunswick. This program will provide up to 50% of the project cost to a maximum of $40 000 per company per year. The minimum amount available per project is $10 000. The remaining costs of the project will be borne by the applicant, either in cash or "in-kind" work. In 2004, the NBJMAP Review Committee recommended that 13 applicants receive assistance for a total of $370 000.

New Brunswick Prospector Development Program (NBPDP)

The New Brunswick Prospector Development Program (NBPDP) was initiated in fiscal year 2001/02 with the same objectives and guidelines as the previous successful program. However, the program has been broken down into several elements: the New Brunswick Prospector Assistance Program ($200 000), Prospector Training ($25 000), Prospector Rewards (up to $5000), and Prospector Promotion ($20 000).

In 2004, the NBPDP Review Committee recommended 41 prospectors receive assistance under the Prospector Assistance Program.

Special Projects

The Targeted Geoscience Initiative (TGI) program, a cooperative venture between the Geological Survey of Canada and the New Brunswick Department of Natural Resources, continues to play a vital role in projects aimed at stimulating exploration activity in New Brunswick. The New Brunswick TGI projects have enjoyed tremendous support from the private sector through logistical and monetary support and information transfer. In 2004, TGI programs included an aeromagnetic survey in the Marrtown area of southern New Brunswick and hydrocarbon potential studies in the Carboniferous Moncton Subbasin and in Devonian rocks of northern New Brunswick.

2.5 QUÉBEC[10]

A Destination of Choice for Mineral Exploration

Overview

The investment climate in Québec is particularly conducive to mineral exploration, as evident by the heightened level of exploration funding and expenditures since the start of the new millennium and significant new discoveries in mineral exploration.

Public financing raised on the Québec financial market in 2003 for carrying out exploration projects in Québec reached $61.4 million, a 65% increase over 2002. Flow-through-share issues increased by $4.6 million (+ 32%) over the previous year. Therefore, the revitalization of financing for mining continued in 2003.

Exploration and deposit appraisal expenditures rose for the third consecutive year to $134 million in 2003, an increase of $22.8 million (+ 21%) (**Table 13**). Québec continues to be the site of approximately 20% of the exploration and deposit appraisal expenditures in Canada. In 2003, worldwide exploration budgets increased for the first time since 1997 to US$2.4 billion. Québec's share of world exploration capital continued to increase, reaching 4% in 2003. In comparative terms, Québec thus ranks seventh in the world in mineral exploration.

In 2003, exploration and deposit appraisal expenditures increased for all of the principal mineral commodities for which exploration is being conducted in Québec, i.e., precious metals (26%), diamonds (24%) and base metals (13%). Total spending amounted to $67.8 million (51% of expenditures in Québec) for precious metals, $41.8 million (31%) for base metals and $18.2 million (14%) for diamonds. Exploration and deposit appraisal expenditures are expected to reach $204 million in 2004, an increase of 52%.

TABLE 13. EXPLORATION FINANCING IN QUÉBEC, (1) AND EXPLORATION AND DEPOSIT APPRAISAL EXPENDITURES (INCLUDING DIAMONDS) IN QUÉBEC, CANADA AND THE WORLD, 1998-2003

	1998	1999	2000	2001	2002	2003
			($ millions)			
QUÉBEC						
Flow-through share issues	12.3	5.9	10.2	10.0	14.6	19.2
Common share issues and debentures	. . .	. . .	15.3	19.8	22.6	42.2
Exploration and deposit appraisal expenditures	127.1	113.5	94.1	102.9	111.2	134.0
For diamonds	2.5	1.2	7.3	7.5	14.7	18.2
CANADA						
Exploration and deposit appraisal expenditures	655.9	504.3	496.7	512.9	573.4	686.7
Québec's share of total Canadian expenditures	19.4%	22.5%	18.9%	20.1%	19.4%	19.5%
Exploration and deposit appraisal expenditures for diamonds	119.1	108.7	91.9	144.7	161.6	168.8
Québec's share of total Canadian expenditures for diamonds	2.1%	1.1%	7.9%	5.2%	9.0%	10.8%
WORLD						
World exploration budgets (US$ millions)	3 700	2 800	2 600	2 200	1 900	2400
Québec's share of total world exploration budgets	2.4%	2.7%	2.5%	3.0%	3.7%	4.0%
World exploration budgets for diamonds (US$ millions)	301	256	223	199	234	320
Québec's share of total world exploration budgets for diamonds	0.5%	0.3%	2.0%	2.0%	4.0%	4.1%

Sources: Service de l'imposition et des données minières (Ministère des Ressources naturelles, de la Faune et des Parcs) and Natural Resources Canada for data on Québec and Canada; Metals Economics Group for world exploration budgets data.

. . . Not available

(1) Only amounts raised in Québec for projects in Québec are indicated. These amounts do not include sums raised via flow-through-share financings by limited partnerships wanting to explore for minerals in Québec. According to estimates, including these financings would increase total flow-through-share financings in Québec to approximately $30 million in 2003.

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[10] The Québec review of activities was prepared by Sylvain Lacroix, Patrick Houle, Pierre Marcoux, Jean Désilets, Lucie Ste-Croix and Jocelyne Lamothe. For more information, the reader is invited to contact Ms. Lamothe by telephone at (418) 627-6289 (ext. 5301) or by e-mail at jocelyne.lamothe@mrnfp.gouv.qc.ca.

Exploration and Deposit Appraisal Highlights

In 2004, several Québec regions experienced intense exploration and deposit appraisal activities for increasingly varied types of mineral commodities.

Northwestern Québec was a favourite location for precious-metal exploration. In 2004, several advanced gold projects were carried out in the Rouyn-Noranda-Cadillac-Val-d'Or axis, where new discoveries were also made. In the Cadillac sector, the Mouska gold mine (Cambior Inc.) resumed mining operations in early October following completion of a project to deepen the shaft. Access to new mineralized zones has added three years to the life of the mine. Agnico-Eagle Mines Ltd. conducted a program (estimated at $30 million) on the Lapa property east of Cadillac involving shaft sinking, underground development, drilling and metallurgical testing. Reserves and resources are estimated at 4.9 Mt grading 8.23 g/t gold. As for the site of the former Kiena mine complex, Wesdome Gold Mines Inc. started up a drilling and exploration drift development project. Drillholes intersected a mineralized zone grading 3.03 g/t gold over 9 m. Near Malartic, Richmont Mines Inc. built an exploration ramp on its East Amphi property. A 9000-m underground drilling campaign is planned and a decision with respect to commercial production of the deposit will be made in the summer of 2005. On the Noralex property, located in the Rouyn-Noranda area 10 km northwest of the Doyon and Mouska mines, Alexis Minerals Corporation and Noranda Inc. intersected auriferous veins grading 3.19 g/t over 15 m. In the Val-d'Or area, Agnico-Eagle Mines Ltd. carried out rehabilitation work on mine infrastructure situated on the Goldex property. Investments totaling approximately $10 million will be made to enhance the reliability of probable reserves, which stand at 21.77 Mt grading 2.4 g/t gold. Century Mining Corp. completed the acquisition of the Sigma-Lamaque mining complex from McWatters Mining Inc. The mine had shut down in October 2003. A drilling program aimed at quantifying the pit's gold reserves began in October. At the Croinor site, Exploration Malartic-Sud Inc. also carried out bulk sampling. East of Val-d'Or, drilling by Alexis Minerals Corporation on the Cadillac Group project's Hogg showing intersected a skarn-type mineralized zone of 21.2 g/t gold and 0.56% copper over 3.8 m.

In the northern section of the Abitibi greenstone belt, Aurizon Mines Ltd. began preparation work for sinking a shaft at the Casa Berardi project. In addition, Aurizon announced a revised estimate of the inferred resource in zones 118 and 120, which doubled to reach 1.7 Mt grading 6.1 g/t of gold for a total of 332 000 oz of gold.

Encouraging results for precious metals and base metals were also recorded in northwestern Québec. As of October 1, 2004, Campbell Resources Inc. had carried out nearly 9000 m of definition drilling at the Copper Rand mine in Chibougamau. Mineral extraction began in November and commercial production should begin in early 2005. In the Matagami area, Noranda Inc. intersected massive and semi-massive sulphides over approximately 6.9 m at a depth of 465 m. The new showing was named "Renaissance." It is located only 7 km southeast of the company's infrastructure. West of Rouyn-Noranda, on the Lac Montbray property, partners Noranda Inc. and Alexis Minerals Corporation obtained an impressive intersection of 5.16 m grading 5.61% copper, 1.70% zinc, 0.34 g/t gold and 17.6 g/t silver at a vertical depth of 110 m.

The James Bay region was the site of two important discoveries. In the Near North, near the Opinaca Reservoir, Virginia Gold Mines Inc. located a rich gold system with the help of surface work and drilling activities. The system has been defined over a lateral distance of approximately 300 m and to a depth of more than 225 m. The project was named "Éléonore." The system comprises two main zones, Roberto (18.85 g/t gold over 16 m) and Roberto Est (4.05 g/t gold over 17 m). The interest generated by this new, highly auriferous geological setting was reflected by increased claim staking activity in this sector. In the La Grande greenstone belt, Virginia Gold Mines Inc. and its partner Noranda Inc. announced the discovery of volcanogenic massive sulphide horizons on the Coulon property: the DOM zone (9.94% zinc, 2.12% lead, 0.73% copper and 96.38 g/t silver over 19.5 m; borehole CN04-17) and the DOM NORD zone (12.65% zinc, 1.54% lead, 1.36% copper, 125.31 g/t silver and 0.3 g/t gold over 4.7 m; borehole CN-04-23).

The James Bay region also continued to attract much interest for diamonds, particularly in the Otish mountains area. In 2004, Ashton Mining of Canada Inc. and SOQUEM Inc. invested approximately $18 million on properties located in the north of the Otish mountains. Their activities included the bulk sampling of 639 tonnes of kimberlitic material from the Renard cluster. The partners are targeting a sample of 300 carats (ct) to be used to assess the diamond value. The first 269 tonnes processed produced a total of 97 ct and resulted in 28 diamonds larger than 0.5 ct, including 5 diamonds over 1 ct. In February 2004, the processing of a 3.87-t sample of erratic blocks from the adjacent Lynx property returned an estimated diamond content of 120 carats per 100 tonnes (ct/ht).

Nickel was actively sought, especially in the Far North of Québec where Canadian Royalties Inc. continued exploration work on the Expo-Ungava property, 15 km south of the Raglan mine, which has been operating since 1998. Canadian Royalties Inc. announced a revised indicated resource estimate of 1.84 Mt grading 1.9% nickel, 2.3% copper and 5.2 g/t platinum plus palladium for the Mesamax deposit, as well as a preliminary inferred resource estimate of 1.4 Mt grading 0.7% nickel, 0.9% copper and 2.7 g/t platinum plus palladium for the Mequillon deposit. Near the Mesamax deposit, Canadian Royalties Inc. also discovered, near the surface, another high-grade nickel-copper-platinum-palladium showing (2.25% nickel, 5.70% copper and 10.01 g/t platinum plus palladium over 56.6 m). Knight Resources Ltd. and Anglo American Exploration (Canada) Ltd. also announced several intersections of interest, including 24.5 m grading 1.71% nickel, 0.8% copper and 1.33 g/t platinum plus palladium. Goldbrook Ventures Inc. also reported the discovery of high-grade nickel-copper-platinum-palladium showings on its Belanger property. Drilling returned grades of 1.35% nickel, 0.61% copper and 2.88 g/t platinum plus palladium over an interval of 49.35 m. Further south, between 55° and 56°, Virginia Gold Mines Inc. and BHP-Billiton carried out nearly $1 million of drilling work on the Gayot property.

With the price of uranium rising, Strathmore Minerals Corp. acquired the mining rights to the Dieter Lake property (approximately 110 km northwest of the Caniapiscau reservoir), whose geological resources are estimated at between 10 and 15 Mt grading 0.25% U_3O_8 or 50 Mt at 0.10% U_3O_8.

Architectural stone is gaining popularity in Québec. The province has reserves of wonderful decorative stone used on buildings and other architectural works throughout the world. For example, Québec granite will be used to rebuild some of the buildings destroyed in the September 11, 2001, terrorist attacks in New York City. Several companies are active in this sector. In 2004, NAMCA Inc. successfully continued the development of two deposits of pinkish violet breccia limestone and whitish grey calcilutite, respectively located in Maria and Saint-Armand. Granijem Inc. began producing a mangerite-type stone, prized for its green colour, near the town of Magpie on the North Shore.

In the industrial minerals sector, Junex Inc. started drilling two new brine wells in Bécancour. The addition of these two wells increased the company's daily natural brine production capacity.

Comparative Advantages and Recent Provincial Initiatives

Québec has had one of the most favourable mineral exploration investment climates in the world for the past five years. Here are the main factors contributing to Quebec's excellent exploration investment climate.

A Rich and Diverse Mineral Potential in a Vast, Open, Little-Explored Territory

Because of the richness of its subsoil, Québec ranks second in Canada in terms of mineral production value. Its mineral wealth is particularly diverse, as illustrated by the production of some 30 mineral commodities in the province. Québec also ranks among the top 20 mining producers in the world, producing, among others, iron, nickel, gold, copper, zinc, niobium, ilmenite and titanium dioxide.

Discovery prospects are extremely attractive, as illustrated by the development of numerous major deposits in the past 100 years, including those of Raglan and LaRonde in the last decade.

Québec has a land area of more than 1.5 million km^2. Over 90% of Québec consists of Precambrian rock, which is known worldwide for hosting many world-class deposits. Even after the recent wave of claim staking for diamonds, the area of about 6.4 million hectares (Mha) covered by claims represents less than 5% of Québec's landmass; consequently, a vast area remains open to exploration. Furthermore, Québec is blessed with favourable geography and possesses well-developed infrastructure that provides ready access to its land by road, rail, water or air.

Abundant and Accessible Geoscientific Information

In Québec, the geoscientific data acquired by government and industry for over 100 years are found in SIGEOM, the province's geomining information system. It contains no fewer than 5200 Quebec Department of Natural Resources, Wildlife and Parks (MRNFP) publications and 62 500 reports produced by mining companies, for a total of 2.3 million pages, 295 000 geological plans and maps, 6800 mineral occurrences, 129 400 diamond drillholes, and 12 million geochemical analysis results obtained from 625 000 samples. The information in this database is valued at over $5 billion and it is constantly being updated and improved.

This geoscientific database is easy to access, particularly with the SIGÉOM à la carte interface (www.mrnfp.gouv.qc.ca/mines). SIGEOM allows all of its mining clientèle to access and consult the data on the Internet anytime, anywhere, and to download, customize and order them through e-commerce.

Geoscientific Knowledge Acquisition

To open northern Québec up to mining exploration, the Géologie Québec branch of MRNFP conducted, between 1995 and 2003, two of the most extensive geological mapping programs in Canada. Under the Moyen-Nord and Grand-Nord programs, 80 new geological maps (at scales of 1:50 000 or 1:250 000) covering an area of close to 400 000 km^2 were produced. The data collected during the Grand-Nord program are currently the subject of various syntheses.

In 2004, MRNFP focused its efforts on knowledge acquisition in more accessible areas in response to resource renewal needs (in particular copper and gold) in mining regions. MRNFP is also working to highlight the mineral potential of little-known new areas in the Chibougamau mining camp extension on the North Shore and in the Gaspé.

Five regional geological surveys at a scale of 1:50 000, two detailed surveys and about fifteen thematic studies were conducted in various areas of Québec during the summer of 2004.

In Abitibi, Géologie Québec continued revising the geological mapping of the Blake River Group between Rouyn-Noranda and the Doyon mine. The aim of this work is to define stratigraphic horizons conducive to volcanogenic massive sulphide (VMS) base-metal deposits. West of Rouyn-Noranda, another study was undertaken on the geology and metallogeny of the western portion of the Blake River Group. Lastly, work on the gold potential along the Porcupine-Destor fault was completed and resulted in the identification of six types of gold mineralization. Further north, to the east of Matagami, the Olga Lake project continued into its third year with the production of a new geological map at a scale of 1:50 000.

Géologie Québec continued its geological mapping program along the Grenville Front; three maps were produced on the eastern extension of the Chibougamau mining camp. This program includes a study on metamorphism.

In the Grenville Province, Géologie Québec conducted a cartographic survey northeast of Mont-Laurier with a view to completing the geological synthesis of the Central metasedimentary belt. This project was supplemented by a study of the industrial minerals potential of this sector. The study of the nickel and copper mineralizations of the Portneuf-Mauricie belt was continued for a second year. On the North Shore, Géologie Québec launched a geological mapping program north of Baie-Comeau that will extend over several years. This region contains iron and titanium, apatite, copper and nickel mineralizations.

In the Appalachians, work was concentrated primarily in the southern part of the Gaspé Peninsula with the updating of six geological maps, a metallogenic study and an assessment of limestones to determine their potential for cement. A geological survey at a scale of 1:20 000 was conducted in the area of the Cascapédia River. Other ad hoc studies were also conducted elsewhere in the Gaspé and in the Lower St. Lawrence region. These included an inventory of aggregate quarries, an assessment of the dimensional stone potential of sedimentary rock, the characterization of a till, and the evaluation of peat resources.

The first results of this work were unveiled in November at the Québec Exploration 2004 congress, which attracted more than 1100 participants in the exploration field from all parts of Canada and elsewhere.

Finally, Géologie Québec produced maps to assess the potential for VMS-type base metals by processing georeferenced data for the sub-province of Abitibi and for the Frotet-Evans belt. Approximately 120 maps at a scale of 1:50 000 will be distributed in March 2005 and will suggest several new exploration targets to mining companies.

A Reliable, Modern Mining Regime

The Québec mining regime is based on the *Mining Act* and is founded on the principle of free mining, i.e., universal access to the resource. Mining titles are now being obtained from map designations, according to predefined boundaries. Titles, together with exclusive rights to search for mineral commodities (with the exception of sand, gravel, clay and other superficial deposits) and a guarantee to receive a mining title in the case of a discovery, are awarded on a first-come, first-served basis. This approach has the advantage of being fast and simple; it also makes the claim indisputable by a third party and protects investments in the claim.

The average cost of acquiring a new designated claim of an average area of 50 ha is $80. This is a real financial boon to explorationists, since the former costs required for staking out and registering a similar area amounted to over $500. Consequently, the acquisition of claims in Québec via map designation is, on average, close to seven times less expensive for the industry than the old method of ground staking.

The Internet application GESTIM offers instantaneous, continuous, anytime and anywhere access to the registry of Québec mining titles at http://gestim.mrnfp.gouv.qc.ca. GESTIM, Québec's mining title management system, enables users to consult and download mining title maps, designate and register mining exploration titles on-line, renew titles, and pay fees through e-commerce.

One of the Lowest Net Exploration Costs in the World

Québec offers several tax incentives that significantly reduce the net cost of exploration for mining companies in Québec and promote the financing of their activities (www.mrn.gouv.qc.ca/mines/fiscalite/index.jsp).

Under the *Taxation Act*, the Québec government introduced the tax credit for resources in 2001. This mechanism provides direct assistance to mining companies that incur eligible exploration expenses in Québec, unlike the flow-through-share regime in which companies give up the right to deduct eligible expenses to an investor. Part of the tax credit for resources is refundable and part is non-refundable.

With respect to the refundable portion, eligible exploration costs incurred after March 30, 2004, may give rise to an entitlement of 35% of the costs incurred by companies that are not mining a mineral resource or 15% of the costs incurred by companies engaged in mining activities. These rates are higher (38.75% and 18.75% respectively) for costs incurred in Québec's Near North or Far North.

The non-refundable portion amounts to 10% of the eligible costs incurred by companies that are not mining a mineral resource and 30% of the costs incurred by companies engaged in mining activities. These rates are lower (6.25% and 26.25% respectively) for costs incurred in Québec's Near North or Far North.

Eligible companies must be active and have a place of business in Québec. The eligible expenditures for the purpose of calculating the tax credit are those that give rise to an entitlement to a deduction of at least 125% under the current flow-through-share regime. This credit is taxable under the *Taxation Act* and the *Mining Duties Act*. Companies have the option of using this credit or the flow-through-share financing program.

In addition, the credit on duties refundable for losses provided under the *Mining Duties Act* is equal to 12% of the lesser of two amounts: the annual loss, or the exploration, deposit appraisal and mine development expenses. The credit is increased to 15% if the exploration expenses have been incurred in Québec's Near and Far North and the tax credit for resources has not been claimed for the expenses. The credit on duties refundable for losses is non-taxable and does not reduce the amount of exploration expenses that a mining company can claim under the *Mining Duties Act* and the *Taxation Act*. Since 2003, however, it is taxable under the federal *Income Tax Act*.

An additional deduction of 50% of qualifying exploration expenses may also be granted under the *Mining Duties Act*, up to a limit of 50% of annual profit. Eligible expenses include surface exploration and underground drilling work performed on land that is not under a mining lease or mining concession, or where no extraction work has been carried out in the previous five fiscal years.

Access to Public Funding, Venture Capital and Exploration Partners

The Québec *Taxation Act* enables a Québec taxpayer (individual) to claim a substantial tax deduction for his or her investment in flow-through shares. The Québec regime allows for a base deduction equal to 100% of the costs of flow-through shares. For shares acquired since March 31, 2004, individuals may deduct an additional 25% when the exploration costs are incurred in Québec by a company not engaged in the mining of mineral resources. A further 25% may be deducted if the exploration is done from the surface, bringing the total deduction to 150% of the cost of the investment.

Another amendment with respect to flow-through shares has been in force since March 31, 2004. Upon the sale of shares, an investor may benefit from an exemption on the capital gain realized on the portion of the sale price between the cost of acquiring the shares and their adjusted cost base, which is deemed to be zero.

For the 2004 taxation year, taking Québec and federal tax benefits into account, the net cost of a $1000 investment in flow-through shares totals some $284 for a Québec individual at the highest marginal tax rate.

Several venture capital funds are dedicated to companies involved in mineral exploration in Québec. The mission of SIDEX (Société d'investissement dans la diversification de l'exploration [exploration diversification investment corporation]) (www.sidex.ca), a limited partnership created in 2001, is to invest in the capital stock of companies with exploration projects that will lead to the diversification of the Québec mining industry, both in terms of commodities extracted and in terms of mineral-producing regions. The initial capital for SIDEX was set at $50 million over five years and was provided by its two limited partners, the Québec government (70%) and the Solidarity Fund QFL (30%). In 2003, SIDEX made 25 investments totaling $6.8 million.

SODÉMEX (Société de développement des entreprises minières et d'exploration [mining and exploration company development corporation]) and SODÉMEX II made 19 investments in 2003, injecting a total of $6.7 million into exploration projects in Québec. These limited partnerships held by Capital d'Amérique CDPQ and SGF Minéral Inc. participate in the development of the mining industry in Québec by investing in junior exploration companies and mining producers with activities in Québec whose market capitalization is below $125 million. These companies are also active on the secondary market and have become key financial backers for exploration in Québec. Some $44 million in capital is provided by the partners. The investment portfolio of these companies is managed by Gestion SODÉMEX.

SOQUEM Inc. (Société québécoise d'exploration minière), which is owned by SGF Minéral Inc., and its partners annually commit over $10 million to off-mine-site exploration work in Québec. This amount excludes expenditures on diamond exploration by partners Ashton Mining of Canada Inc. and SOQUEM Inc. in the northern part of the Otish mountains.

In addition to its participation in SIDEX, the Solidarity Fund QFL (www.fondsftq.com/internetfonds.nsf/AccueilAn_flash?OpenPage) invests in mining companies and mineral exploration companies. The Nord-du-Québec Regional Solidarity Fund QFL and the Abitibi-Témiscamingue Regional Solidarity Fund QFL also invest in the mineral exploration sector. In all, these funds invested some $1.5 million in capital and debentures in 2003 with 10 Québec exploration companies. Most of these investments are directed toward bringing new orebodies into production or helping the growth of Québec mining producers, with the remainder being allocated primarily to working capital support for exploration companies.

Lastly, MRNFP (the Québec Department of Natural Resources, Wildlife and Parks) continued to encourage Aboriginal communities in the Near and Far North to participate in the development of the mineral potential of this vast area. To that end, a budget of $0.3 million was granted in 2004-05 to each of the following two Aboriginal mining funds: the Cree Mineral Exploration Board and the Fonds d'exploration minière du Nunavik (Nunavik mining exploration fund). In addition, $0.05 million was granted to the Fonds minier Nitassinan (Nitassinan mining fund).

2.6 ONTARIO[11]

Ontario – The Jurisdiction of Choice

Ontario is recognized as a prime mineral investment jurisdiction because of its stable political regime, favourable taxation, access to skilled labour, stable regulatory environment that supports sustainable development practices, and world-renowned geology and mineral endowment. The Ontario Geological Survey (OGS) maps, documents and promotes Ontario's geology and mineral endowment and mineral investment opportunities. Many of the exciting exploration highlights summarized are the result of mineral industry exploration decisions based on the foundation of independent and credible OGS geological maps and staff recommendations. Ontario is excited about the variety of current mineral resource exploration projects, but there are many more mineral investment opportunities. Contact the local OGS staff for more information.

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[11] The Ontario review of activities was prepared by staff of the Ministry of Northern Development and Mines. For more information, the reader is invited to contact Peter Cashin by telephone at (705) 670-5620 or by e-mail at peter.cashin@ndm.gov.on.ca.

Overview

Gold, diamonds, magmatic copper-nickel-platinum-palladium and copper-zinc-silver volcanogenic massive sulphide (VMS) mineralization are still the primary focus of the exploration industry in Ontario. Exploration levels approached historical highs in 2004 due to the unusual coincidence of high values for most of the primary metals and many other secondary commodities, particularly industrial minerals.

Preliminary estimates for 2003 indicate that the total value of Ontario's mineral production in the two commodity groups (metals and nonmetals) that comprise the industry total was $5.54 billion. This represents a decrease of 6.6% from the $5.94 billion reported in 2002. The contribution of each commodity group to the 2003 Ontario total was $3.27 billion (59%) for metallic minerals and $2.27 billion (41%) for nonmetallic minerals. In 2003, Ontario produced 34% of Canada's metallic minerals and 25% of its nonmetallic minerals.

The five highest-value metallic minerals produced in Ontario during 2003 were gold ($1253 million), nickel ($1192 million), copper ($393 million), platinum group metals ($232 million), and zinc ($85 million). Combined these represent 96% of the total value of Ontario's metallic mineral production in 2003.

In 2003, Ontario yielded 59% of Canada's nickel production, 55% of its gold production, 30% of its copper production and 85% of its platinum group metals (PGMs) production.

Ontario retained its position as the lead Canadian province in the value of non-fuel mineral production despite a decline in the value of production. A 6% rise in the value of gold helped to offset a decline in the value of nickel, copper, zinc and PGMs. In 2003, Ontario accounted for 27% of Canadian non-fuel mineral production. Company spending intentions for 2004 indicate that Ontario will lead all Canadian provinces and territories in terms of exploration and deposit appraisal expenditures with forecast expenditures of $248 million, amounting to 25% of Canada's total expenditures. In 2003, exploration and deposit appraisal expenditures totaled $219 million.

Also in 2003, a total of $433 million was spent on mineral exploration, deposit appraisal and mine complex development in Ontario. Total expenditures by activity in 2003 were $174 million (40%) for exploration, $45 million (10%) for deposit appraisal, and $214 million (50%) for mine complex development.

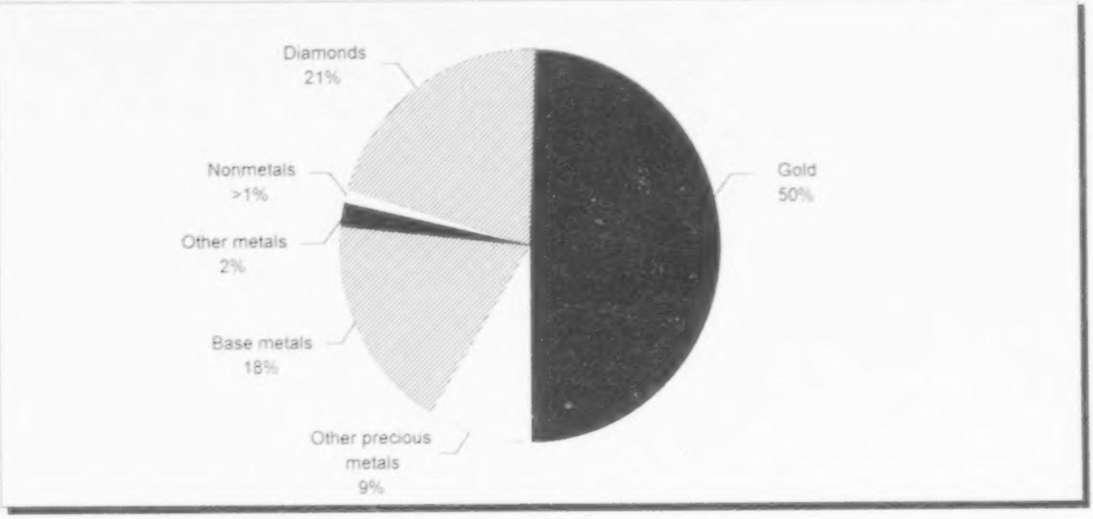
Forecasts for 2004 mineral exploration, deposit appraisal and mine complex development expenditures total $597 million. The increase is attributable to higher exploration and mine complex development expenditures.

In 2003, spending by Ontario's junior mining companies increased by about 39% to $71 million from $51 million in 2002. However, the most significant increase in 2003 was in spending by Ontario's senior mining companies, which increased by almost 70% to $148 million from $88 million in 2002.

Forecasts for 2004 indicate that spending by Ontario's junior companies will increase by 65% from 2003 to $117 million and that spending by Ontario's senior companies will decrease slightly to $131 million. Increasing off-mine-site expenditures continue to reflect the more prominent role in exploration spending by junior companies working in Ontario.

Gold continues to be the most sought-after commodity in Ontario despite increasing activity around diamonds and base metals (**Figure 19**). Much of the increase in exploration expenditures during 2003 was due to more activity around existing gold mines and known deposits.

Figure 19
Exploration Spending in Ontario, by Mineral Commodity Sought, 2004 (e)



Source: Ontario Ministry of Northern Development and Mines.
(e) Estimate.

The number of mining claims in good standing in Ontario at the end of 2003 was 182 945, a slight increase from 180 073 in 2002.

Assessment work in Ontario declined in 2003 as the value of the work went from $44 million in 2002 to $38 million in 2003.

Spotlight on Base Metals

World prices of the principal base-metal commodities (copper, zinc, lead and nickel) have nearly doubled since early 2003. This positive price movement has raised the investment profile of many of the mining companies active in Ontario, particularly those holding strong base-metal property portfolios. This increased investor interest is expected to result in a significant increase in exploration activity for base metals in Ontario.

Since the discovery of the rich nickel-copper deposits of the Sudbury district in the latter part of the 1800s, Ontario has become Canada's most important producer of copper, zinc and nickel (**Table 14**). Additional discoveries of world-class copper and zinc deposits in the Manitouwadge (1950s) and Kidd Creek (1960s) areas of Northern Ontario have also contributed to the province's base-metal production leadership position.

TABLE 14. IMPORTANCE OF ONTARIO AS A BASE-METAL PRODUCER, 2003

Commodity	Historical Production	2003 World Ranking
Nickel	11.0 million tons	2nd
Copper	15.0 million tons	13th
Silver (as a by-product)	1 billion ounces	15th
Zinc	10.0 million tons	17th

Source: Ontario Ministry of Northern Development and Mines.

Commodity price weaknesses for most base metals throughout most of the 1990s and early 2000s siphoned exploration investment interest away from the search for these metals. The lack of exploration for new sources of base metals, particularly for copper, zinc, by-product silver and lead, has accelerated the depletion rates of these commodities. Exploration is critical for Ontario and Canada to retain a leadership role in base-metal deposit discovery and production.

Although the Kidd Creek mine (**Figure 20**) north of Timmins remains Ontario's lone VMS (zinc-copper-silver) producer, several important base-metal exploration projects in Ontario are worth noting:

- KWG and Spider Resources are working in the McFaulds Lake area near the western extremity of the James Bay Lowlands. Drilling in the Archean basement rock below Paleozoic cover returned significant base-metal values. The best drilling results returned 8.02% copper over 18.8 m and 4.38% copper, 4.80% zinc, 0.39 g/t gold and 15.43 g/t silver over 5.2 m. Similar greenstone rock sequences have been observed to outcrop to the west of this area.

- Diamond drilling by Canadian Golden Dragon Resources Ltd. at its Vanguard prospect, in the Shebandowan Belt, returned values grading up to 6.39% zinc, 1.89% copper, 28.31g/t silver and 0.88 g/t gold over an interval of 4.15 m.

- Diamond drilling by Tribute Minerals Inc. at its Dixie Lake property, in the Red Lake area, returned values of 6.69% zinc, 0.34% copper and 5.01 g/t silver over 2.6 m.

- In Ben Nevis Township, northeast of Kirkland Lake, Wallbridge Mining Company intersected 7.14 g/t gold and 5.48% zinc over 3 m in diamond drilling from a known alteration and sulphide mineralized system.

- Tribute Minerals Inc. recently acquired the Melchett Lake VMS property, north of Nakina. The property hosts several occurrences of polymetallic zinc-lead-copper-silver-gold VMS- style mineralization. Selected grab samples from the Relf zone averaged 13.0% zinc, 1.2% lead, 0.26% copper and 0.32 g/t silver. The best results returned 19.1% zinc, 2.2% lead, 0.4% copper, 0.56 g/t silver and 1.72 g/t gold.

Exploration Highlights - Northwestern Ontario

Regular production at Goldcorp Inc.'s Red Lake mine (650 tons per day at a grade of 77.5 g/t gold) and sinking of the #3 shaft continued unabated. Year-end target shaft depth is estimated to be 762 m, with completion by late 2006 at a final depth of 2179 m. The US$85 million expansion program will see the new shaft hoisting approximately 4000 tons per day and the mill processing a nominal 1000 tons per day (www.goldcorp.com).

Placer Dome (CLA) Inc. and Wolfden Resources Inc. are conducting an 18 000-m diamond-drilling program on the East Bay gold property. Down-dip projections of the West Deeps, East Deeps and Hot Spot No. 1 zones are targeted with two machines from the west shore of the East Bay of Red Lake (www.placerdome.com and www.wolfdenresources.com).

At the Musselwhite mine, Placer Dome undertook exploration to focus on defining and extending mineral reserves and resources at PQ Deeps, Island, Esker South and Esker North. Off-site exploration is planned for the Kenpat, Karl Zeemel, Libert Lake, Graf Lake and Ranger South areas.

Rubicon Minerals Corporation completed diamond drilling of the Phoenix zone on its McFinley project in Bateman Township. The results to date have tested only a very small part of the overall system. Rubicon is working towards building a definable resource that will include high-grade shoots, such as the PZ-1, that averages 20.69 g/t gold over 3.27 m (www.rubiconminerals.com).

Figure 20
Active Mines in Ontario, 2004

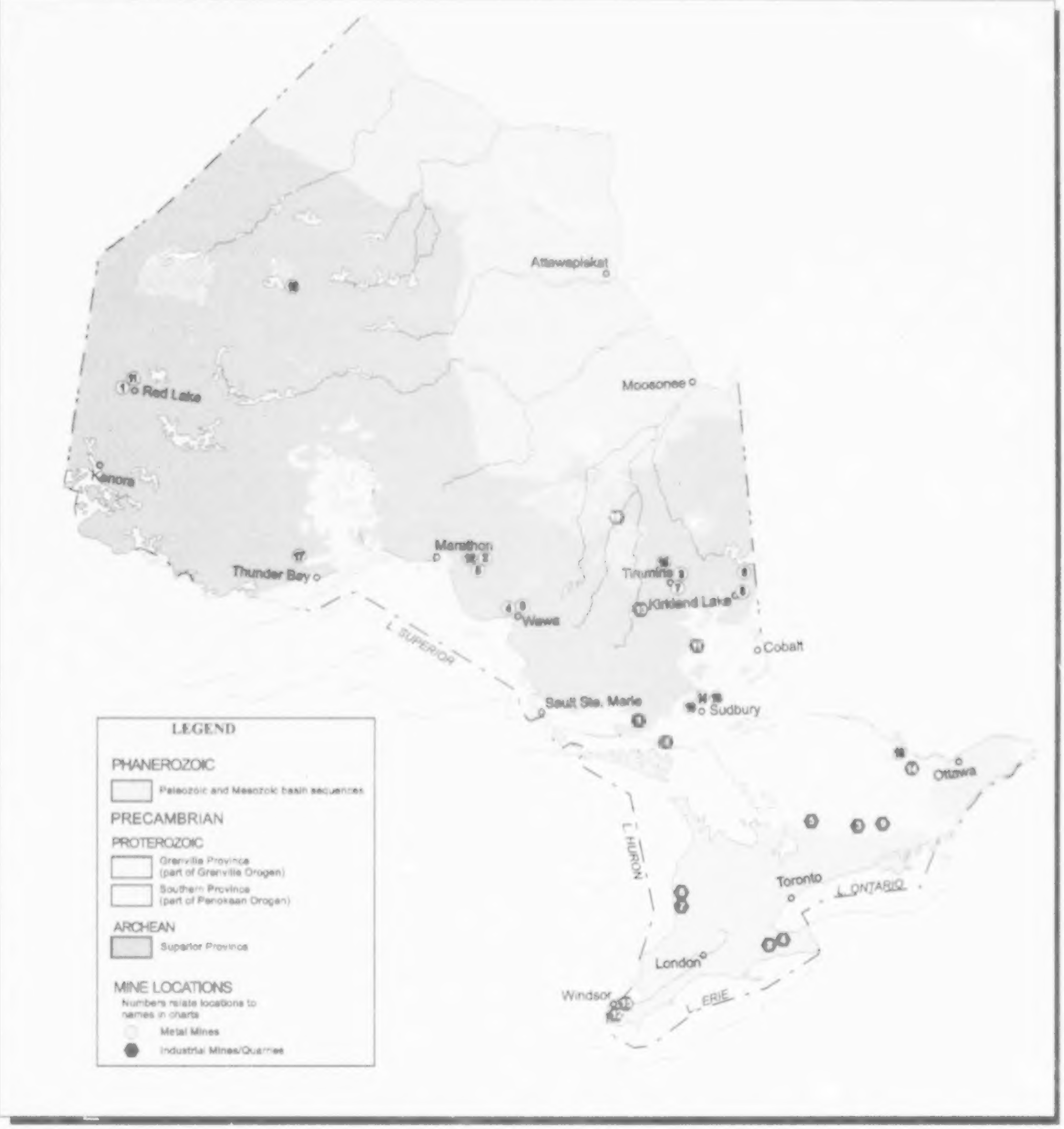

Attawapiskat
Moosonee
Red Lake
Kenora
Thunder Bay
Marathon
Wawa
Timmins
Kirkland Lake
Cobalt
Sault Ste. Marie
Sudbury
Ottawa
Toronto
London
Windsor
L. SUPERIOR
L. HURON
L. ONTARIO
L. ERIE
LEGEND
PHANEROZOIC
Paleozoic and Mesozoic basin sequences
PRECAMBRIAN
PROTEROZOIC
Grenville Province (part of Grenville Orogen)
Southern Province (part of Penokean Orogen)
ARCHEAN
Superior Province
MINE LOCATIONS
Numbers relate locations to names in charts
○ Metal Mines
● Industrial Mines/Quarries

Figure 20
Active Mines in Ontario, 2004

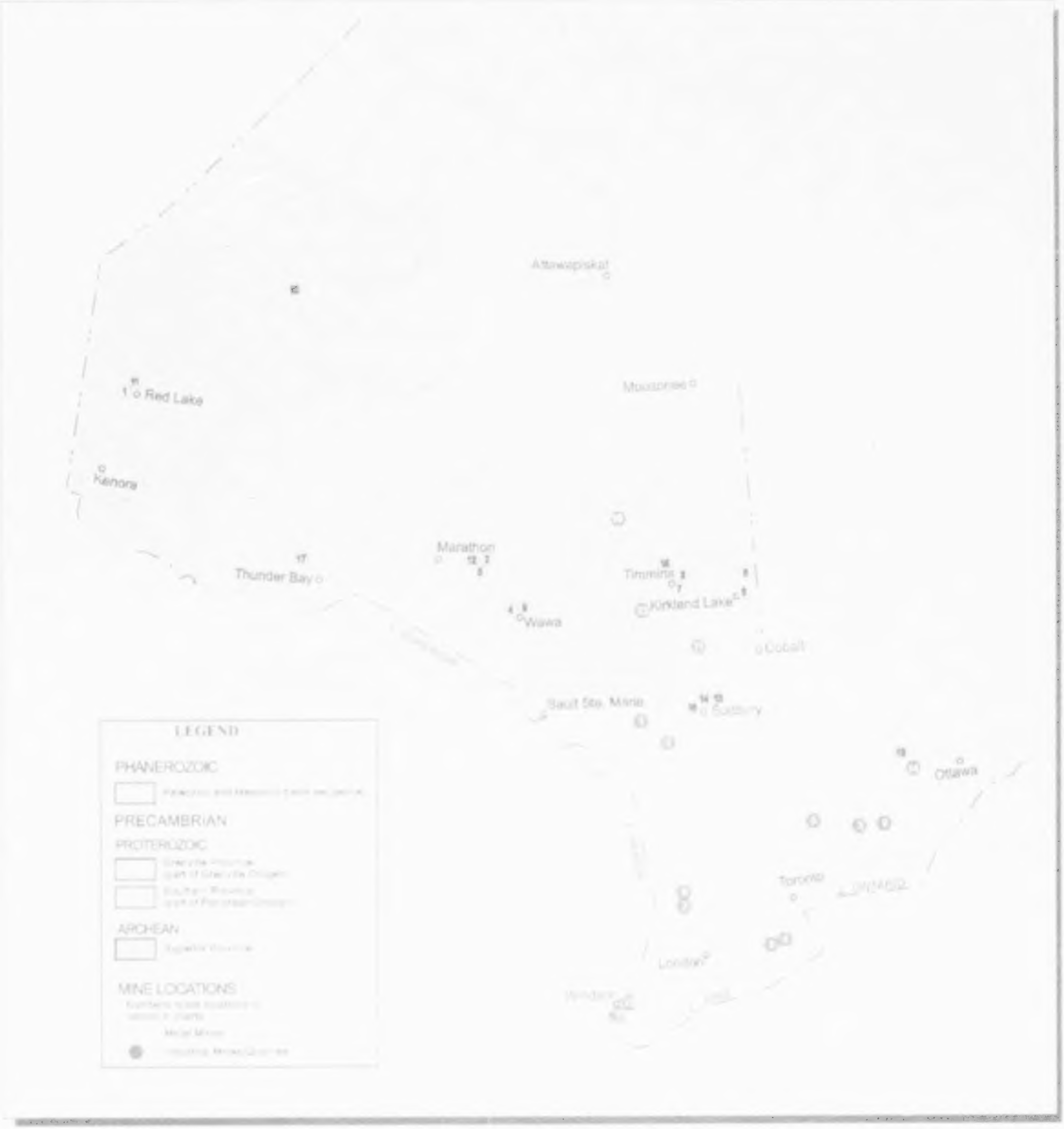

Attawapiskat
Red Lake
Kenora
Moosonee
Thunder Bay
Marathon
Wawa
Timmins
Kirkland Lake
Cobalt
Sault Ste. Marie
Sudbury
Ottawa
Toronto
London
Windsor
LEGEND
PHANEROZOIC
PRECAMBRIAN
PROTEROZOIC
Grenville Province
(part of Grenville Orogen)
Southern Province
(part of Penokean Orogen)
ARCHEAN
Superior Province
MINE LOCATIONS
Metal Mines
Industrial Mines/Quarries

Figure 20 (cont'd)

Gold Mines

1.	Campbell	Placer Dome Canada Ltd.
2.	David Bell	Teck Cominco Limited, Barrick Gold Corporation
3.	Dome	Porcupine Joint Venture (1)
4.	Eagle River	River Gold Mines Ltd.
5.	Golden Giant	Newmont Mining Corporation of Canada Limited
6.	Holloway	Newmont Mining Corporation of Canada Limited
7.	Hoyle Pond	Porcupine Joint Venture (1)
8.	Macassa	Kirkland Lake Gold Corporation
9.	Mishi	River Gold Mines Ltd.
10.	Musselwhite	Placer Dome Canada Ltd.
11.	Red Lake	Goldcorp Inc.
12.	Williams	Teck Cominco Limited, Barrick Gold Corporation

Base-Metal Mines (nickel, copper, zinc, lead)

13.	Fraser	Falconbridge Ltd.
	Lockerby	Falconbridge Ltd.
	Onaping/Craig	Falconbridge Ltd.
	Lindsley	Falconbridge Ltd.
14.	Copper Cliff North	INCO Ltd.
	Copper Cliff South	INCO Ltd.
	Creighton	INCO Ltd.
	Garson	INCO Ltd.
	Gertrude	INCO Ltd.
	Lower Coleman	INCO Ltd.
	McCreedy East	INCO Ltd.
	Stobie	INCO Ltd.
15.	Kidd Creek	Falconbridge Ltd.
16.	McCreedy West	FNX Mining Company Inc., Dynatec Corporation

Platinum Group Metal Mines

17.	Lac des Iles Mine	North American Palladium Ltd.

Other Metal Mines (magnesium, calcium, strontium)

18.	Timminco Metals	Timminco Ltd.

Major Industrial Mineral Operations

1.	AMP Quarry (carbonatite)	Agricultural Mineral Prospectors Inc.
2.	Badgeley Island Quarry (silica)	Unimin Canada Ltd.
3.	Blue Mountain Operations (nepheline syenite)	Unimin Canada Ltd.
4.	Caledonia No. 3 Mine (gypsum)	Georgia-Pacific Canada Ltd.
5.	Cavendish Twp. Mine (vermiculite)	Regis Resources Inc./Canadian Vermiculite
6.	Goderich Brine Field (salt)	Sifto Canada Inc.
7.	Goderich Mine (salt)	Sifto Canada Inc.
8.	Hagersville Mine (gypsum)	CGC Ltd.
9.	Henderson Mine (talc)	Dynatec Corporation – Canada Talc Division
10.	Kapuskasing Phosphate Operations	Agrium Inc.
11.	North Williams Mine (barite)	Extender Minerals of Canada Ltd.
12.	Ojibway Mine (salt)	The Canadian Salt Company Limited
13.	Penhorwood Mine (talc)	Luzenac Inc.
14.	Tatlock Quarry (calcium carbonate)	OMYA (Canada) Inc.
15.	Windsor Brine Field (salt)	The Canadian Salt Company

Source: Ontario Ministry of Northern Development and Mines.

(1) The Porcupine Joint Venture was formed in July 2002 to combine the assets of Placer Dome Canada Ltd. and Kinross Gold Corporation in the Timmins area.

Planet Exploration Inc. and Goldcorp Inc., at their Sidace Lake-Coli property, conducted an aggressive winter drill program. They succeeded in further defining gold mineralization 1) in the Main Discovery zone, 2) four km to the southwest in the West zone, 3) in the Deep Footwall zone at a depth of 1440 m, and 4) in the skarn-like host of the South zone (www.planetexploration.info).

Tribute Minerals Inc. continued exploration on its Garnet Lake property. Two drill programs were designed to test targets identified by Titan-24 IP/MT geophysical surveys over known zinc-copper-gold-silver mineralization of the Arrow zone. A high-grade section graded 17.4% zinc, 0.68% copper, 0.32 g/t gold and 28 g/t silver over 4.25 m. Included in this section was a massive sulphide section assaying 40.02% zinc and 3.39% copper over 0.5 m (www.tributeminerals.com).

Houston Lake Mining Inc. resumed work on its Angel Hill gold zone located in the Dogpaw Lake area, approximately 60 km southeast of Kenora. The company completed a 20-hole diamond drill program aimed at providing sufficient data for a resource estimate. The best intersection from the program returned 3.81 g/t gold over 5.45 m (www.houstonlakemining.com).

Amador Gold Corp. completed a 10 000-m drill program on its KPM Shoal Lake property west of Kenora. The current indicated resource is estimated at 1.1 Mt grading 6.63 g/t gold (234 000 oz), along with an additional inferred resource of 832 000 t grading 5.63 g/t gold (151 000 oz). Further exploration, including diamond drilling and geophysical surveys, is planned (www.amadorgoldcorp.com).

Roxmark Mines Limited has two gold projects in the Beardmore area: 1) the Sand River-East Leitch property, and 2) the Amorada-Nortoba property. The latter hosts a significant molybdenum resource. Extensive stripping and bulk sampling will be undertaken (www.roxmark.com).

Champion Bear Resources Ltd. returned to its Plomp Farm property located west of Dryden. An eight-hole, 2800-m drill program was completed along with re-logging and lithogeochemical analysis of previously drilled core. Results from the new drillholes included 2.42 g/t gold over 1.4 m and 1.52 g/t gold over 3.5 m. The company plans to conduct an additional 5000 m of diamond drilling along with geophysical surveys (www.championbear.com).

True North Gems Inc. returned to its Ghost Lake Emerald property northeast of Dryden. A 2-t mini-bulk sample was excavated, removed from the property and shipped to two separate laboratories to evaluate total beryl content and emerald grade. Results from the testing on the sample material will provide the company with an initial assessment of the potential for the property (www.truenorthgems.com).

The Lac des Iles mine of North American Palladium Ltd. produced 75 970 oz of palladium, 6319 oz of platinum, 6249 oz of gold, 1.06 million lb of nickel and 2.1 million lb of copper during the second quarter of 2004. A total of 1 445 445 t of ore was mined at a head grade of 2.22 g/t palladium. North American Palladium Ltd. has begun a $40 million underground expansion of the Lac des Iles mine, including driving a decline ramp down 2000 feet below the main pit to reach 720 000 t of resources. The $55 million project will include a $10 million upgrade to the mill (www.napalladium.com).

Freewest Resources Ltd. has extended the strike length of the mineralized zone on its Larose property (Shebandowan Belt) to 3.7 km. Grab sample assays of up to 14 g/t gold have been reported. Stripping, sampling, linecutting, magnetometer and IP (induced polarization) geophysical surveys, geological mapping and prospecting are presently being undertaken (www.freewest.com).

East West Resource Corp. and Canadian Golden Dragon Resources Ltd. have obtained nickel-copper-platinum group elements (PGE) values from two horizons of the Seagull Intrusion in hole WM01-08. Values of up to 0.69% copper, 0.37% nickel, 1.78 g/t platinum and 2.1 g/t palladium were intersected. The PGE horizon was intersected in two additional holes, assaying up to 3.8 g/t platinum plus palladium, 0.38% copper and 0.30% nickel (www.eastwestres.com).

Kings Bay Gold Corporation and Richview Resources Inc. completed the first phase of an exploration program on their Pickle Lake properties, involving a 20-hole, 10 000-foot drilling program, geophysics and channel sampling. Several gold-bearing zones, returning up to 22.4 g/t gold over 0.5 m and 1.6 g/t gold over 4.5 m, were discovered in drilling near the Southwest Powderhouse zone (www.kingsbaygold.com).

Marathon PGM Corporation is actively exploring its Marathon PGM-copper project. A $1.0 million exploration program of sampling, drilling and deposit-related work is ongoing. A total of 3500 m of diamond drilling is planned. The best drilling results were returned from the Malachite zone, which graded 2.7 g/t palladium plus platinum plus gold (total platinum metals - TPM) and 0.45% copper over 10.0 m and 2.07 g/t TPM over 18.0 m (www.marathonpgm.com).

ValGold Resources Ltd. completed 3450 m of diamond drilling on its Tower Mountain property. Highlights include hole DDH-04-12, which intersected 40.5 m of 1.05 g/t gold, and hole DDH-04-14, which intersected 3 m of 5.17 g/t gold. Further drilling is planned (www.valgold.com).

Kodiak Exploration Limited spent approximately $1.8 million on its Knucklethumb property in the Oboshkegan Lake area, northwest of Geraldton, in 2004. In addition to exploring and extending known gold-bearing zones, several new zones, some containing visible gold, were uncovered in 2004 (www.kodiak-resources.com).

Exploration Highlights - Northeastern Ontario

Apollo Gold Corp. continues to increase the gold resource at its Black Fox mine near Matheson, where it has a proven and probable open-pit resource of 3 255 000 tons grading 0.14 oz/ton gold. An additional deep resource is estimated to contain approximately 552 000 oz of gold (www.apollogold.com).

Aurora Platinum Corp. continues to evaluate its Foy Offset properties, north of Sudbury. At its Nickel Lake property, recent diamond drilling encountered significant mineralization grading 1.03% nickel, 0.87% copper and 0.53 g/t platinum plus palladium over 10.6 m (www.auroraplatinum.com).

Canadian Arrow Mines Ltd. announced the completion of its bulk sample on the Alexo zone in Dundonald Township. The company will now complete a 10 000-t bulk sample on the Kelex West and Central West nickel zones on the Alexo property. Stripping of the Kelex zone has commenced and diamond drilling on the zone intersected 2.1 m of 1.4% nickel (hole LOX-38-04) and 2.2 m of 4.9% nickel (hole LOX-77-04) (www.canadianarrowmines.com).

First Nickel Inc. completed nine diamond drillholes on its Dundonald property. Drilling on the North Sector of the Dundonald South nickel zone reported drill intersections of up to 4.42% nickel over 4.28 m followed by another intersection of 11.84% nickel over 1.7 m (www.firstnickel.com).

FNX Mining Company Inc./Dynatec Corporation announced the official opening of the McCreedy West mine in Levack in September. Feasibility studies were advanced at the Levack mine and McCreedy West PM deposit, which are expected to provide production feed in the near future. A $30 million advanced underground exploration program was also announced for the Norman 2000 and Norman North deposits (www.fnxmining.com).

Holmer Gold Mines Ltd. and Lakeshore Gold Mines Corp. have tripled the drill-indicated resource to 1 369 000 tons grading 10.96 g/t gold at their Bristol Township property west of Timmins. Surface diamond drilling continues on the property. Lakeshore subsequently acquired all shares of Holmer Gold to form a new business combination (www.lsgold.com).

Kirkland Lake Gold Inc. is currently dewatering the Macassa mine, conducting progressive mine rehabilitation, continuing surface and undergound exploration drilling, and mining gold ore on an ongoing basis. Total proven, probable, measured and indicated reserves/resources are 4.5 million tons grading 12.7 g/t gold (www.klgold.com).

Mustang Minerals Corp. continues to intersect nickel mineralization at its property near Matachewan. The company reported that the C zone had an average weighted grade and thickness of 1.85 m at 2.07% nickel and 0.06% cobalt (www.mustangminerals.com).

The Luciuk-Fenwick-Shelly partnership is continuing to re-evaluate the East Breccia copper-molybdenum prospect located adjacent to the past-producing Tribag copper mine near Sault Ste. Marie. Previous work on the property infers a non-compliant (National Instrument 43-101) resource of 125 million tons grading 0.13% copper and 0.04% molybdenum sulphide (MoS_2).

Gitennes Exploration Inc. undertook induced polarization, soil and rock geochemical work, and geological mapping over its Esten Township property near Elliot Lake. The property covers a zone of highly siliceous, chlorite-altered "granitic schist" containing disseminated and fracture-controlled copper mineralization. Small surface zones with multiple intercepts of 0.2% to 1.7% copper mineralization were reported from previous work on this property in the 1950s and 1970s (www.gitennes.com/index.html).

Pacific North West Capital Corp. and joint-venture partner Anglo American Platinum Corporation Limited report an updated mineral estimate for their River Valley property for the Dana and Lismer's Ridge zones. The measured and indicated resource currently stands at 25.4 Mt grading 0.98 g/t palladium, 0.34 g/t platinum and 0.06 g/t gold (1 121 200 oz palladium plus platinum plus gold). An additional inferred resource of 3.6 Mt containing 127 100 oz palladium plus platinum plus gold exists for the Dana, Lismer's Ridge and Varley zones (www.pfncapital.com).

Patricia Mining Corp. reports its underground diamond-drilling program at the Island Gold project in Finan Township showed excellent continuity both vertically and horizontally and all gold-bearing zones are open at depth. The company also announced that the ramp on the Localsh zone has been dewatered and 100 m of exploration drifting has been completed on the 125-m level. The company reported an inferred resource of 20.6 Mt grading 2.35 g/t gold. This includes a higher-grade inferred resource of 2.03 Mt at a grade of 8.3 g/t gold (www.patriciamining.com).

Spider Resources Inc. and KWG Resources Inc. continue to explore their McFauld's Lake copper-zinc-silver VMS discovery. Diamond drilling continues to intersect significant widths of copper and zinc sulphide mineralization. Intercepts of a 5.2-m interval grading 4.38% copper, 4.80% zinc, 0.39 g/t gold and 15.43 g/t silver, and, more recently, an impressive 18.8 m grading 8.02% copper, were returned from the McFaulds #3 zone (www.spiderresources.com and www.kwgresources.com).

St. Andrew Goldfields Ltd. announced that the Clavos decline ramp reached a length of 1000 m and the company anticipates the ramp will reach the 250-m level, or 1600 m in length, by mid-November. Exploration drifting on the 100-m level has confirmed the continuity and characteristics of the Clavos mineralization. A bulk sample of approximately 20 000 t will be tested at the Stock gold mill commencing in September (www.standrewsgoldfields.com).

Contact Diamond Corporation (formerly Sudbury Contact Mines) reported a total of 1449 diamonds, weighing 67.4 carats (ct), were recovered from a 652-t mini-bulk sample collected late in 2003 from their 95-2 kimberlite in Lundy Township. Twelve of the recovered diamonds exceeded 3.35 mm and four of these exceeded 1 ct. The company also discovered two new diamondiferous kimberlite pipes, the KL-22 pipe in Klock Township and KL-01 in Van Nostrand Township west of New Liskeard (www.contactdiamond.com).

Temex Resources Corp. reported a gold resource update on the Juby Main zone in Tyrrell Township. The drill-indicated resource for the Core zone is 2 230 000 t grading 1.81 g/t gold. Inferred resources for the Core zone, Gold Halo and Upper Porphyry zones are 8 Mt grading 1.74 g/t gold. These values are amenable to open-pit extraction (www.temexcorp.com).

Wallbridge Mining Company Limited recently announced that drilling of the Broken Hammer zone on the Wisner property in Sudbury has encountered several thick intersections of high-grade PGE-copper mineralization. These new intersections include a 20.53-m interval in hole WIS-028 averaging 5.60 g/t platinum, 6.02 g/t palladium and 2.11 g/t gold. Included in this interval are 15.35 m grading 6.86 g/t platinum, 7.45 g/t palladium and 2.68 g/t gold, along with 6.55% copper and 0.38% nickel. Exploration on the property continues (www.wallbridgemining.com).

Exploration Highlights - Southern Ontario

Limerick Mines Limited continued exploring its nickel-copper prospect in Limerick Township. Sulphide mineralization occurs as massive and disseminated pyrrhotite, chalcopyrite and pentlandite in folded ultramafic rocks. Magnetic and electromagnetic surveys were completed over the prospect. Five diamond drillholes were completed to verify the results of previous exploration.

Pelangio Mines Inc. continued exploration of the company's Simon Copper polymetallic copper-zinc-gold volcanogenic massive sulphide deposit in Denbeigh and Lyndoch Townships, west of Ottawa. The company recently completed an airborne geophysical survey over the entire property and expanded its land position. The survey identified key anomalies including one approximately 2 km south of the known copper deposit (www.pelangio.com).

Randsburg International Gold Corp. has completed diamond drilling on its nickel-cobalt-copper-PGM properties in McClintock Township, east of Huntsville. The company reports success in diamond drilling of targets identified by airborne geophysical surveys (www.randsburgdiamonds.com).

Hanson Brick Ltd. announced that the Niagara-on-the-Lake quarry, which last produced in 1980, would be re-activated in 2005 to supply Queenston Formation shale to the company's two Burlington brick plants. In addition, Hanson Brick has applied for a licence to open a new Queenston Formation shale quarry off Tremaine Road within the city of Burlington. The 38.5-hectare (ha) site has an estimated 13-14.5 Mt of accessible resource.

Two companies on the western edge of the Greater Toronto Area have applied for new zoning and licences to extract Amabel Formation dolostone for high-quality aggregate products. Lowndes Holdings Inc. has a site within the northeast corner of the city of Hamilton and with approvals would extract 3 Mt annually. James Dick Construction Ltd. intends to extract 2 Mt/y from its town of Caledon location.

2.7 MANITOBA[12]

Overview

Exploration and Development

Preliminary estimates for exploration and deposit appraisal expenditures in Manitoba for 2004 are $32.6 million, nearly 20% higher than the $27.2 million spent in 2003. A higher, stable price for gold has resulted in dramatic spending increases in the province for the yellow metal since 2002. With many metals reaching multi-year price highs, Manitoba is attracting many new companies to explore its diversified mineral endowment.

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[12] The Manitoba review of activities was prepared by the Mineral Resources Division of Manitoba Industry, Economic Development and Mines. For more information, the reader is invited to contact Ric Syme, Director, Manitoba Geological Survey, by telephone at (204) 945-6556 or by e-mail at rsyme@gov.mb.ca.

The total area of mining claims and mineral exploration licences as of November 1, 2004, was 3 298 445 ha compared to 2 383 906 in 2003. The total area of mineral dispositions and leases in good standing as of November 1, 2004, was 3 492 971 ha compared to 2 578 114 ha at the end of 2003. Surface exploration diamond drilling in 2003 was 74 717 m, down from 78 346 m in 2002.

BASE METALS

Hudson Bay Mining and Smelting completed the final phase of the 777 project, the development of the 777 mine. The $400 million project, which commenced in 2000, consisted of six components. These components included expansion and upgrading projects at the Flin Flon metallurgical plant and the development of two new underground mines. The 777 mine reached full production of 1 Mt/y in January 2004. The deposit contains mineable reserves of 14.5 Mt grading 4.56% zinc and 2.5% copper, and significant precious-metal credits. Hudson Bay Exploration conducted geophysics and drilled SPECTREM airborne targets in the Flin Flon-Snow Lake belt and beneath Paleozoic-aged rocks in the Hargrave Lake-Moose Lake area. Drilling was also carried out in the vicinity of current and past-producing mines.

In October, Ontzinc Corporation entered negotiations to acquire 100% of Hudson Bay Mining and Smelting from parent company Anglo American International for $325 million. The deal includes Hudson Bay Mining and Smelting's five operating mines, two concentrators, the Flin Flon copper smelter and zinc refinery, and its large land position in Manitoba and Saskatchewan. Negotiations are expected to be completed by the end of 2004.

Nuinsco Resources Limited and partner Inco Limited conducted winter drilling on the Mel deposit, northwest of Thompson. An updated mineral resource calculation prepared by Inco estimates the deposit to contain a measured and inferred resource of 2.75 Mt grading 0.77% nickel. Mineralization at the Mel deposit lies at a depth of between 46 m and 183 m, and could be partially mined by open pit and trucked 40 km to the Thompson smelter complex.

Canadian Royalties Inc. entered into an option agreement to acquire a 50% interest in Inco's Thompson Nickel Belt South property. The property covers key stratigraphy along the Thompson Nickel Belt from Thompson south to the Wabowden area. With Inco acting as operator, Canadian Royalties is required to spend $1.0 million per year for five years, after which the partners will form a joint venture. AMT (Audio Frequency Magnetotellurics) and UTEM (University of Toronto Electromagnetic Method) geophysics were conducted and drilling of some initial drill targets was completed during the winter of 2004.

Anglo American Exploration (Canada) has acquired a substantial land position in the Thompson area in the last few years. The company conducted geophysics and drilling on its permits at Rock Lake and Paint Lake.

Crowflight Minerals Inc. entered into an option agreement with Falconbridge Limited on a 190-km^2 property package in the Wabowden area, south of Thompson. The deal includes the Bucko deposit, which contains 1.2 Mt grading 2.71% nickel as indicated resources. Crowflight has initiated an extensive work program, including surface and underground drilling, to upgrade the resource base to the reserve category and bring the project to production.

Falconbridge and partner Donner Minerals Ltd. completed another round of geophysics and drilling at their Stephens Lake property near Gillam. The area is extensively covered by overburden and is suspected to contain an extension of the Thompson Nickel Belt. The partners reported that no ultramafic rocks were intersected in any of the holes.

BHP Billiton Diamonds Inc. has an option agreement with Cream Minerals Ltd., Sultan Minerals Inc. and ValGold Resources Ltd. to explore potential nickel targets on their Stephens Lake project, 100 km east of Gillam. The property consists of three exploration licences and a group of claims. BHP Billiton Diamonds Inc. flew airborne magnetic and Versa Transient Electromagnetic (VTEM) surveys over the large property in winter 2004. At least six high-priority targets have been selected for drilling in early 2005.

In the Leaf Rapids area, Rare Earth Metals Corporation conducted geophysics and drilling at its South Bay nickel property. In the fall of 2003, Rare Earth announced that it had discovered nickel-bearing sulphides in blast rubble from a new road cut. Nickel grades were reported to average 2.42%. The 2004 drill program intersected the ultramafic host rock, but no nickel sulphides were encountered.

Mustang Minerals Corp. acquired the past-producing Maskwa property in southeastern Manitoba in June 2004. The property contains the Maskwa deposit which, in 1999, was estimated to host a measured resource of 2.66 Mt of 1.27% nickel and 0.21% copper, plus cobalt and platinum group metal values. Mustang Minerals conducted a fall in-fill drill program to document historical resources and to assist in an updated National Instrument 43-101 compliant resource calculation. Drilling was to resume in early 2005 to significantly increase potential tonnage at Maskwa.

GOLD

Bema Gold Corporation conducted another extensive program of winter and summer drilling at the Monument Bay project in northeastern Manitoba. Using a cut-off grade of 8 g/t, the inferred resource is now estimated at 1 069 258 t averaging 15.36 g/t representing 528 041 oz of gold. The estimate is based on drilling to date excluding the summer 2004 drill program, which tested recently discovered zones to the west of the main Twin Lake gold zones. Drilling will continue in 2005 to outline and enlarge the gold resource on the Twin Lakes and Seeber River zones. Wolfden Resources is Bema's joint-venture partner in the Monument Bay project.

Canadian Gold Hunter Corp. and partner Rare Earth Metals also completed winter and summer drilling programs at their Assean Lake property, northeast of Thompson. Drilling intersected high-grade gold mineralization at the Hunt zone, including a 2.35-m interval of 27.91 g/t gold. Winter drilling also tested reconnaissance targets on the large property, which straddles a major structural break - the Assean Lake shear zone. Gold mineralization has been discovered in six zones on the property to date.

Near Lynn Lake, Trans America Industries Inc. completed a 19-hole drill program on its Arbour Lake property. No significant gold values were reported.

The New Britannia mine in Snow Lake was given a reprieve from closure in September. The mine was scheduled to close permanently in November, but the discovery of a new ore zone (with better grades) led operator Kinross Gold Corporation to decide to continue operations for another three years. A drift was being driven to conduct drilling on the new ore zone to firm up reserves. Ore development work will also resume on the Dick zone. The mill will remain closed until June 2005 before it will be able to operate on an ongoing basis of about 1400 t/d. When the mine and mill reach full capacity in summer 2005, the New Britannia work force will total about 150.

Just west of Snow Lake, Foran Mining Corporation was busy with underground ramp development and the extraction of a bulk sample. Results from the underground sample were slightly lower in grade compared to the surface bulk sample, which returned grades of between 9.5 and 14 g/t gold. The company was conducting mine planning and engineering studies for site development. A building was purchased to house the new mill, which has been ordered. Additional drilling is planned to upgrade reserves.

In central Manitoba, NDT Ventures Ltd. conducted ground geophysics on its exploration licence in the Oxford Lake area. Previous drilling in the area is reported to have intersected gold-bearing iron formation, which returned 4.1 m of 5.40 g/t gold.

Puma Exploration Inc. also picked up exploration licences in central Manitoba. Surface sampling at its Butterfly Lake property returned up to 99 g/t gold. A 2005 drill program is planned.

Placer Dome Inc. conducted work on an exploration lease optioned from W.S. Ferreira Ltd. in the southeast Island Lake area. The property hosts a number of high-grade gold showings and has a geological environment reported to be similar to the Red Lake camp. Also at Island Lake, Falcon Ventures Inc. completed a program of shallow drillholes on its Sagawitchewan Bay property. Drilling tested two gold occurrences that returned only anomalous gold values.

In southeastern Manitoba, San Gold Resources Corporation and Gold City Industries Ltd. formed a partnership to create Rice Lake Joint Venture Inc. (RLJV) and purchase 100% of Harmony Gold Canada. By doing so, the two juniors became 50/50 owners of Harmony's Bissett gold mining operation. Harmony had placed the operation on care and maintenance in 2001 due to the sagging price of gold. The operation consists of an 1100-t/d mill and a mine that received significant upgrading in the mid- and late 1990s. An audit conducted in 2002 concluded that the Bissett mine currently has a proven and probable mineable reserve of 818 000 t grading 9.2 g/t gold. The partners intend to rehabilitate the mine and put it back into production. The partnership also gives RLJV control of San Gold's properties located to the east and along strike of the Bissett mine. The mine horizon has been traced for up to 15 km on the properties now controlled by RLJV. San Gold has conducted substantial drilling on the eastern extension of the mine horizon over the last few years. To date, three near-surface deposits of gold mineralization have been located, which could provide additional feed for the Bissett mill. The most advanced is the San Gold #1 deposit where the partners are preparing to go underground to extract a bulk sample.

Wildcat Exploration Ltd. conducted geophysical surveys in the spring of 2004 at its Poundmaker, Siderock and Jeep gold properties in the Bissett area. Summer mapping and sampling programs were carried out at Poundmaker and Siderock. Drilling was to commence in November, starting with the Poundmaker property and shifting to the other properties in early 2005. Drilling will test newly discovered zones of gold mineralization and the potential of the past-producing Jeep and Poundmaker deposits.

Placer Dome conducted a winter drill program to test the down-dip extension of known gold mineralization near the past-producing Ogama-Rockland mine near Long Lake. The property is under option from Mid-North Resources Ltd.

Marum Resources Inc. continued to acquire more property in the Rice Lake Belt. The company now holds nine properties throughout the belt. A 10-hole reconnaissance drill program was conducted in the winter of 2004 on the Strike Point property adjacent to the Bissett mine. Summer and fall mapping and sampling programs were conducted on the Beresford Lake, Strike Point and Gem properties.

Gossan Resources Limited conducted a spring drill program at its Angelina gold property, east of Bissett, where mainly low-grade gold values were encountered. A summer mapping program was reported to have located three new zones of interest. Sampling from one of the zones returned 43.7 g/t in a 1-m chip sample.

PLATINUM GROUP METALS

Gossan Resources substantially increased the size of its property holdings along the Bird River sill in the Lac du Bonnet area. New research conducted by the Manitoba Geological Survey (MGS) suggests that high-grade nickel-PGM mineralization may have been remobilized some distance from its source within the sill. Gossan Resources conducted summer work, including geophysical and geochemical surveys, as well as geological mapping.

Wildcat Exploration acquired Arc Metals Ltd.'s PGE property located near Reed Lake in the Flin Flon-Snow Lake Belt. The Reed Lake property contains platinum-palladium mineralization hosted by a 6-km-long by 4-km-wide mafic-ultramafic layered intrusion.

DIAMONDS

The search for diamonds in Manitoba began to heat up again in 2004. The area of significant new interest has shifted from the Oxford-Knee lakes area (of the late 1990s) to the Hudson Bay Lowland and the Seal River area west of Churchill. In the Hudson Bay Lowland, near the Ontario border, Foran Mining, Diamonds North Resources Ltd., Falcon Ventures Inc. and Indicator Explorations Ltd. have acquired significant holdings.

Foran Mining conducted airborne and ground geophysics and completed a short drill program in the summer. Drilling did not intersect kimberlite but it did encounter a 100-m topographic depression in bedrock filled with unusual sediments. The sediments are suspected to be of Cretaceous to Jurassic age, which would make them of equivalent age to the kimberlites found in the Hudson Bay Lowland in Ontario.

Major companies BHP Billiton Diamonds and Ashton Mining of Canada acquired permits in the Hudson Bay Lowland west of York Factory in the Nelson River area. Geodex Minerals Ltd. and Arctic Star Diamond Corp. teamed up to explore 10 exploration licences optioned from a numbered Manitoba company. The 10 licences are located southeast of the BHP Billiton Diamonds and Ashton properties.

Nustar Resources Inc. entered into an option agreement with BHP Billiton Diamonds to drill a large kimberlite target identified in a MegaTEM airborne survey carried out by BHP Billiton Diamonds in the Seal River area.

SPECIALTY/INDUSTRIAL MINERALS

Rare Earth Metals continues to investigate its Eden Lake carbonatite complex, 35 km northwest of Leaf Rapids. The complex shows rare earth element (REE) enrichments over an extensive area. High-grade veins, carbonatite dikes, fenitic selvages of the carbonatite dikes, and altered syenite and other host rocks have been identified. The highest REE concentrations are in the dikes (up to 1.6% total REE, 9764 ppm strontium and 745 ppm yttrium) and in hydrothermal REE-rich veins (up to 13.8% total REE, 5307 ppm yttrium and 5465 ppm throrium plus uranium).

Sunterra Horticulture (Canada) Inc. is in its third year of sphagnum peat production from a bog located 10 km south of the Lake Winnipeg Narrows on the west shore. The Berger Group continued to develop a sphagnum peat bog 20 km south of Hadashville in southeastern Manitoba.

In December 2003, Gossan Resources received positive test results in a characterization study of a 75-kg bulk sample of high-purity Inwood dolomite from Manitoba's Interlake. The test was carried out by Mintek, a leading South African-based mineral and metallurgical firm. Mintek is building a magnesium pilot plant facility, which will use a continuous advanced thermal magnesium extraction process based on atmospheric silicothermic reduction of calcined dolomite.

During the summer of 2004, Gossan Resources carried out a series of reverse circulation test holes on its high-purity silica sand property near Seymourville on the east shore of the south basin of Lake Winnipeg. The purpose of the holes was to develop a resource estimation and to determine the purity and grain size characteristics of the sand for various potential applications.

Sodium chlorate for the pulp and paper industry continued to be produced by ERCO Worldwide (a division of Superior Plus Inc.) at its Hargrave plant (10 km east of Virden) and by Nexen Inc. at its Brandon plant. Raw material for the ERCO plant is obtained by salt dissolution of the Devonian Prairie Evaporite. Nexen, the world's largest producer of sodium chlorate, presently purchases salt for its Brandon plant from Saskatchewan potash producers. However, in 2004, Nexen obtained five quarry leases to solution mine salt, also in the Hargrave area. Nexen's plant production, one of the largest in North America, will be expanded by 65 000 t/y, which will increase annual capacity to over 260 000 t.

Tantalum Mining Corporation continued exploration for tantalum- and cesium-bearing pegmatites in the Bernic Lake area in southeastern Manitoba.

Manitoba Geological Survey Activities

Geoscience activities of the Manitoba Geological Survey (MGS) provided support to traditional mining camps, stimulated new exploration and development opportunities in frontier areas, and supported land-use, geohazard and development priorities in southern Manitoba.

The federal government's Targeted Geoscience Initiative (TGI) entered its second and final year (ending in March 2005). This initiative has brought $5 million/year to enhance geoscience programming across Canada. In Manitoba, the three following TGI projects involved collaboration between the MGS and the Geological Survey of Canada (GSC):

- The Trans-Hudson–Superior Margin Metallotect project (with Saskatchewan, Ontario and Québec) includes multi-agency bedrock mapping, geochronology, tracer isotope work and structural geology aimed at stimulating exploration for nickel, gold and diamonds in an area that is home to more than 27 000 Manitobans. A high-resolution aeromagnetic survey of eleven 1:50 000 NTS sheets was completed in 2004 and the maps were released in November 2004.

- The Williston Basin Architecture and Hydrocarbon Potential project (with Saskatchewan) includes geoscience knowledge inventory, regional mapping (subsurface), geophysical investigations, regional hydrogeology, remotely sensed imagery, hydrocarbon assessment, and a three-dimensional geological model.

- The Western Churchill Metallogeny project aims to compile and synthesize geoscience knowledge spanning northern Alberta, Saskatchewan and Manitoba, and most of mainland Nunavut.

The Thompson Nickel Belt is one of the most richly mineralized segments of the Superior Margin Metallotect. Work by the MGS in the Thompson Nickel Belt continues to focus on defining the nature and extent of the nickel-hosting Ospwagan Group metasedimentary succession. Using sophisticated isotopic tools, this work is helping to extend the known limits of the Thompson Nickel Belt through areas of poor exposure northeast of Thompson and to expand the geographic area prospective for nickel deposits.

The northwestern margin of the Superior craton is the site of many exploration targets, including nickel (in extensions of the Thompson Nickel Belt), shear-hosted gold (associated with ancient crust and regional deformation zones at Assean Lake), and diamonds. Mapping in the Superior Boundary zone is being conducted by the MGS in a three-year project that includes as partners Manitoba Hydro, the University of Alberta, Waterloo University, the University of Manitoba, and the Geological Survey of Canada (GSC). This work will contribute to an understanding of the tectonic configuration of the Boundary zone and provides a valuable tool for outlining possible new targets for exploration.

In the far north, archival samples from the Nejanilini granulite domain were analyzed to provide samarium-neodymium isotope data from one of Manitoba's last large tracts of land that is relatively unknown and unexplored in terms of its geological nature, evolution and mineral potential. The Archean granulitic rocks of the Nejanilini Domain form part of a stable cratonic crust that may have developed a deep lithospheric keel; moreover, the Nejanilini and adjacent crustal domains form the margin of the Archean Rae-Hearne craton, making the study area a prime target for kimberlite exploration.

Field projects in support of gold exploration were conducted in the Bissett and Lynn Lake areas (historic gold mining regions), as well as in east-central Manitoba and the Superior Boundary zone (locations of current exploration interest). The escalating price of gold sparked considerable interest in this metal and a number of companies acquired ground positions to explore in Manitoba.

Projects aimed at supporting base-metal and platinum-group-metal exploration were conducted in the Flin Flon, Snow Lake and Lynn Lake areas, as well as in southeastern Manitoba. These studies range from detailed mapping of mine stratigraphy at Flin Flon (with researchers from Laurentian University) to the use of surficial geochemistry as a tool to locate massive sulphide mineralization.

Researchers from Brandon University and the GSC documented a variety of styles of mineralization and alteration along the "Eden deformation corridor" in the Lynn Lake-Leaf Rapids region, including carbonatite bodies rich in rare earth metals, nickel-copper-PGE sulphides, sulphide-facies iron formation, rare metal pegmatites, thorium-uranium radiometric occurrences, and various forms of hydrothermal alteration.

Northern Manitoba has seen intensive staking in the past six years in response to positive and widely spread diamond indicator mineral results from MGS surveys in the Superior Province. The MGS is continuing with data compilation and interpretation to maximize the quantity, quality and digital distribution of public-sector information on Manitoba's kimberlite potential. These initiatives include:

- The Manitoba Kimberlite Indicator Mineral (KIM) database, which was created in order to bring all existing published data together in one coherent package. Over 30 publications containing more than 5000 samples are included, with much of the data now available on the Survey's Internet GIS Map Gallery. The KIM database, now at version 3.0, has been upgraded and updated since its initial release in early 2003 to include several new features and datasets, and a new and consistent mantle garnet classification.

- Work on till samples and Phanerozoic stratigraphy in the Hudson Bay Lowland.

- An "integrated anomaly map," created from the compilation of diverse datasets in a GIS (Geographic Information System) to produce a presentation identifying structural and petrological anomalies that may have some bearing on kimberlite exploration.

In November 2004, the first 16 sheets of a new 1:250 000 compilation series focussing on Quaternary geology was released covering all of southern Manitoba. Geology polygons are draped over a digital elevation model, making this seamless series invaluable for land-use studies in the province.

Over the past several years, drillhole and surficial mapping databases were reformatted by the MGS to be used in a GIS environment to provide input into livestock management issues relating to groundwater. This work involved the construction of a three-dimensional geological model for the subsurface geology in agro-Manitoba. The mapping utilizes computer technology and is designed to also support activities related to hydrocarbon and industrial mineral development.

As part of Manitoba's Northern Development Strategy, aimed at improving the quality of life for northern communities through education and employment opportunities, a 10-week Prospector Training Program will be offered by the University College of the North beginning in the spring of 2005. The program is an introduction to mineral exploration and mining modeled on a pilot program delivered in Sagkeeng First Nation in the spring of 2003.

Outreach activities developed to increase public awareness of Manitoba's mineral resources and exploration and mining industry were offered again in 2004 as part of Provincial Mining Week celebrations and also at the annual Manitoba Mining and Minerals Convention. The free activities drew more than 2000 visitors from the general public and the school tours program.

Incentives

MINERAL EXPLORATION ASSISTANCE PROGRAM (MEAP)

The Mineral Exploration Assistance Program (MEAP) provides financial assistance of up to 25% of eligible exploration expenditures to a maximum of $300 000 per recipient per fiscal year to companies or individuals undertaking mineral exploration in Manitoba. The program, established in the fall of 1995, aims to increase mineral exploration and stimulate activities that may lead to the development of new mines and industrial mineral deposits. Companies or individuals may qualify for up to 35% of eligible exploration expenditures to a maximum of $400 000 per recipient per fiscal year in specified areas of the province. MEAP conducts two offerings per fiscal year to coincide with the spring/summer and fall/winter exploration seasons.

MEAP announced its first offering of $1 million in October 1995, followed by $3 million per fiscal year for three years beginning January 2, 1996, and ending March 31, 1999. A continuation of the program was approved in June 1998 with $8.25 million of assistance allocated over a three-year period beginning April 1, 1999. In April 2002, Manitoba reconfirmed its commitment to mineral exploration in the province by renewing MEAP for an additional three years and offered $7.5 million in funding over the three-year period. To further stimulate exploration in areas affected by mine closures, MEAP was expanded to provide a higher percentage of assistance on eligible expenditures for projects in the Lynn Lake-Leaf Rapids area and the Bissett region.

Program Highlights From October 1995 to October 31, 2004

- A total of 122 companies have participated in MEAP, representing 416 exploration projects.
- Of the 122 companies, 85 are considered new to Manitoba, including 7 joint-venture partners; 20 are major exploration companies and 102 are junior companies (a company is considered a major exploration company if its market capitalization is greater than $100 million).
- A total of $17.7 million in assistance has been issued to 416 completed projects.
- A total of $96.2 million in exploration expenses has been reported.
- Reported exploration expenditures under the program indicate that every $1 million in assistance paid generated $5.4 million in exploration expenditures.

Several companies with MEAP-assisted exploration projects had exciting results to announce in 2004. Canadian Gold Hunter Corp. continues to intersect high gold values on the heels of its new gold discovery in 2003 at Assean Lake, and Bema Gold Corporation continued to explore and add to its significant gold resource in northeastern Manitoba. In the southeast, Rice Lake Gold Corporation continues to explore and appreciably expand its gold resource in and around the former producing Bissett (San Antonio) gold mine. Additional nickel resources were identified in the Thompson Nickel Belt by Nuinsco Resources (near Thompson), by Crowflight Minerals (near Wabowden) and by Mustang Minerals (in the Bird River area of southeastern Manitoba).

MANITOBA PROSPECTORS ASSISTANCE PROGRAM (MPAP)

The Manitoba Prospectors Assistance Program (MPAP) was introduced in 1992 at an annual funding level of $100 000 per year to provide financial support to self-employed prospectors. Qualified applicants received up to 50% of expenditures incurred to a maximum assistance level of $7500 per applicant per year upon completion of the field project and submission of an acceptable report. To increase the level of mineral prospecting in Manitoba, the MPAP funding level was increased to $150 000 per year for each of fiscal years 1996 through 1998. Upon evaluation of the program, annual funding for MPAP was decreased to its current level of $125 000 per year in 1999. In 2001, the Prospectors Assistance Program Regulation was amended to increase the assistance available for projects undertaken in more remote areas of the province. For these projects, the Regulation provides up to an additional $1500 per year for the cost of chartered fixed-wing aircraft. In April 2002, the Manitoba government renewed MPAP for another three years at its previous funding level of $125 000 per year.

Since the inception of this program, 264 projects have been completed with approved expenditures totaling $2 337 616. A total of $1 168 808 has been paid out. The summer 2004 program received 13 applications for estimated project expenditures of $152 995.

MANITOBA MINERAL EXPLORATION TAX CREDIT (MMETC)

The Manitoba Mineral Exploration Tax Credit (MMETC) was introduced by the Government of Manitoba in April 2002 to promote investment in Manitoba-based exploration projects. The MMETC is a 10% non-refundable personal income tax credit for investors in eligible flow-through shares of qualifying mineral exploration companies and can only be applied against Manitoba tax payable. The MMETC parallels and tops up the 15% federal exploration tax credit. Eligible investments and qualifying exploration activity are tied to federal eligibility, except that substantially all of the exploration activity must be undertaken in Manitoba.

Since November 2003, a reported $20 million (based on company press releases) has been raised via flow-through-share financings for exploration in Manitoba. However, at the time of writing this report, it was difficult to accurately determine the amount that will be eligible for the MMETC. The most recent data indicate that close to $60 000 was claimed pursuant to the MMETC in 2002. It still appears that investments qualifying for the MMETC may fulfill one of the objectives of the tax credit - to help support local companies and junior exploration companies operating in the province.

ASSAY CREDIT PROGRAM

For the 2003/04 fiscal year, the province allocated $20 000 towards this program. A prospector can earn assay credit coupons for eligible expenditures on exploration work. Coupons can be redeemed for assays of gold, silver, copper, lead, nickel, zinc, molybdenum, chromium, titanium or tin as specified in Manitoba Regulation 64/92. Coupons can also be redeemed for geochemical analysis of other metals not covered in the Regulation by obtaining permission from the Assessment Geologist of the Mines Branch.

In fiscal year 2003/04, a total of 4822 credits were issued to eight prospectors; three prospectors redeemed 1346 credits.

Land Use

Progress towards meeting provincial obligations for Treaty Land Entitlement, Northern Flood and Grand Rapids Forebay agreements was made. One hundred and sixteen land selections representing approximately 154 764 ha were assessed and approved. Land selections containing valid mineral dispositions in good standing were documented. New procedures for land selections for the Grand Rapids Forebay Agreement are being developed.

The implementation of the Network of Protected Areas Action Plan and the identification and assessment of candidate sites continued with special attention given to Wildlife Management Areas, northern areas of special interest and Crown land in agro-Manitoba.

Policy development and implementation for the provincial sustainable development initiative focussed on areas such as the Code of Practice, Financial Management Guidelines, Sustainability Indicators and Reporting, Mineral Strategy, and the East Side of Lake Winnipeg and Shoal Lake Watershed Management Plan. Principles and practices of sustainable development were incorporated into several land management plans.

More information on exploration and mining in Manitoba is available on the Manitoba Industry, Economic Development and Mines' Mineral Resources Division web site at www.gov.mb.ca/itm/mrd.

2.8 SASKATCHEWAN[13]

Overview

In 2004, total exploration expenditures are projected to reach $53 million,[14] up more than 60% from actual total expenditures of $31.3 million in 2003 (**Figure 21**). These expenditures reflect a significant upturn in uranium exploration, as well as increases in diamond and gold exploration. Saskatchewan remained the pre-eminent producer of potash and uranium, providing about one-third of world supply for each of those commodities. Gold, copper, zinc, salt, sodium sulphate, aggregate, bentonite and silica sand were among other mineral commodities produced in 2004.

In the Athabasca Basin, the world's premier exploration district for high-grade uranium deposits, about $26 million will be spent in 2004, nearly double the 2003 figure. A steady rise in the spot market price of uranium, since a near-historic low at the end of 2000, reflects mounting concerns about looming supply shortages. This significant increase in uranium exploration has been mirrored by a dramatic upturn in staking activity. Major programs are those of producers Cameco and COGEMA and the junior company UEX, although at least another 20 companies were also active at the end of October 2004. Exploration programs ranged from traditional boulder prospecting to sophisticated geophysical methods targeting deeply buried deposits and diamond drilling for regional target testing and follow-up deposit delineation.

Diamond exploration in the Fort-à-la-Corne district, 60 km east of Prince Albert in central Saskatchewan, was robust in 2004. On October 29, 2004, more than 30 companies and individuals held in excess of 890 000 ha, mostly in the Fort-à-la-Corne area, for diamond exploration. These holdings are up by more than 25% from 2003. Total expenditures are forecast at $17 million, up significantly from the actual total expenditures of $12 million in 2003 (**Figure 21**). Overall, the advancement of capital-intensive diamond evaluation projects reflects a positive long-term view for the exploration potential of the district. A milestone was surpassed in 2004 with the recovery of a significant parcel of diamonds, including several large stones weighing up to 19.7 carats (ct), from an underground bulk sampling program at Shore Gold Inc.'s Star kimberlite. In late 2003 and into the first half of 2004, the Fort-à-la-Corne Joint Venture reported results from its 2002-03 drill programs and, in the fourth quarter of 2003, completed a significant drill program on high-priority kimberlites. The joint venture announced plans for a new focused program of exploration drilling and mini-bulk sampling beginning in the fall of 2004.

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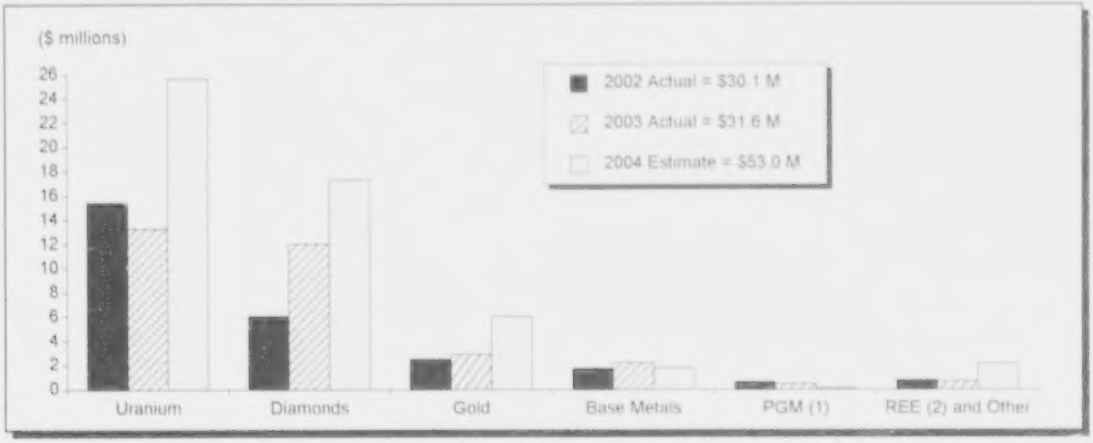
[13] The Saskatchewan review of activities was prepared by Lynn I. Kelley (Saskatchewan Geological Survey) and Pam Schwann (Mines Branch, Saskatchewan Industry and Resources). For more information, contact Gary Delaney, Director, Saskatchewan Geological Survey, by telephone at (306) 787-1160 or by e-mail at gdelaney@ir.gov.sk.ca.

[14] These expenditures are from the annual survey of mineral exploration expenditures undertaken by the Saskatchewan Geological Survey.

Figure 21
Mineral Exploration Expenditures in Saskatchewan, 2002-04



Source: Data compiled from the annual survey of exploration expenditures by the Saskatchewan Geological Survey.
(1) Platinum group metals. (2) Rare earth elements and tantalum.

Gold exploration expenditures are forecast to exceed $6 million, double the total of 2003. Work is being done by junior exploration companies and small-capital mining companies. Claude Resources continued with an aggressive exploration program around its Seabee mine, completing large drill programs at Porky and Santoy lakes. In the La Ronge gold belt, Golden Band Resources completed gold-in-till geochemical surveys and planned underground sampling of the high-grade but narrow ore shoots of the Bingo deposit.

Exploration levels for base metals and platinum group metals remained low in 2004. Exploration for rare earth elements in northernmost Saskatchewan continued in 2004. Great Western Minerals Group prospected the structure that hosts the JAK zone and confirmed the presence of rare earth mineralization in three occurrences along a strike length of 9 km.

Information Sources

This paper is a review of current activity only. The publication *Geology, and Mineral and Petroleum Resources of Saskatchewan*[15] provides a more comprehensive summary of the economic geology of the province, including historical reserve and production data. Web sources for up-to-date information on all Saskatchewan mineral occurrences are the *Saskatchewan Geological Atlas*[16] and the *Saskatchewan Mineral Deposits Index*.[17] Versions of both are available at the Saskatchewan Industry and Resources web site at www.ir.gov.sk.ca.

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[15] Saskatchewan Geological Survey (2003): *Geology, and Mineral and Petroleum Resources of Saskatchewan*; Saskatchewan Industry and Resources, Miscellaneous Report 2003-7, 173 pp.

[16] Slimmon, W.L. (2003): *Geological Atlas of Saskatchewan*, version 5 (2003); Saskatchewan Industry and Resources, CD-ROM, version 6.

[17] Bennett, R.W. (2003): *Saskatchewan Mineral Deposits Index*; Saskatchewan Industry and Resources, Miscellaneous Report 2003-6, CD-ROM, version 1.0.0.

A variety of grade, tonnage, reserve and resource data are reported herein. Current exploration expenditure forecasts are compiled from the annual survey of exploration expenditures by the resident geologists of the Northern Geological Survey Branch, Saskatchewan Industry and Resources. Actual annual expenditures for previous years are from the same survey. Grade, tonnage, reserve and resource numbers reported herein are from a variety of public sources, including published reports, public records, corporate web sites, and Saskatchewan Mining Association fact sheets. They do not necessarily conform to current Canadian Institute of Mining and Metallurgy (CIM) standards and National Instrument 43-101 of the Canadian Securities Administrators.

Exploration

Uranium

Strengthening uranium prices, renewed interest in the Athabasca Basin and significant staking activity took place throughout 2004 and continued into early winter. More than 20 companies, including some that are new to the Basin, are actively exploring for uranium. Most of this activity is in the eastern part of the Athabasca Basin where most of the major deposits are located. Many of the programs are joint ventures. The largest programs are operated by Cameco Corporation, COGEMA Resources Inc. and junior UEX Corporation. Cameco, one of the most active explorers of the Basin, is undertaking a spectrum of programs ranging from greenfield reconnaissance exploration to advanced delineation work. At the Eagle Point mine, brownfield exploration programs were restarted in 2003 after a 10-year hiatus with recent drilling delineating zones for potential additional reserves. The Millennium deposit, a new discovery announced at the end of 2002, is one of the most prospective. It is part of the Cree Extension project, partnered by Cameco, COGEMA and Japan-Canada Uranium (JCU), and is located southwest of McArthur River. The best published intersection of 4.28% U_3O_8 over 30.3 m is considered to be ore grade. The discovery was the result of a persistent drill follow-up of regional clay alteration zones and geochemical anomalies, with target delineation by sophisticated electromagnetic (EM) and gravity surveys.

COGEMA also completed both greenfield and mine-area exploration in 2004. It continues to search for deposits on the McClean Lake property in the hope of increasing reserves.

UEX Corporation has 13 uranium projects either 100% owned, joint-ventured or under option totaling 248 000 ha. These projects are in the western, eastern and northern parts of the Basin. In March 2004, UEX announced that it had an option to acquire a 49% interest in eight of COGEMA's western Athabasca Basin exploration plays by agreeing to contribute $30 million in exploration expenditures over the next 11 years. The properties include Shea Creek, those adjacent to Shea Creek and those in the Mirror River area. Shea Creek's Anne deposit is thought to contain about 18 155 tonnes (t) of uranium (47 million lb U_3O_8) at an average grade of 2.54% uranium (3% U_3O_8) and remains open ended. COGEMA remains the operator for these projects. The first phase of exploration, in the second half of 2004, is a $5.4 million program that includes directional drilling to further delimit the Anne and Collette deposits and geophysical surveys planned for the Shea Creek property and many of the adjacent properties.

On the east side of the Basin, another of UEX's major programs was focused on its 56 418-ha Hidden Bay property, southwest of the historic Rabbit Lake deposits. In early 2004, UEX's partner and exploration manager on the project, Cameco Corp., completed a $875 000 program of diamond drilling and geophysics on four areas: West Bear, Moosippi, Vixen Lake and Shamus. Previously, Gulf Minerals had reported a resource estimate of 485 t of uranium (1.26 million lb U_3O_8) at an average grade of 0.37% uranium (0.44% U_3O_8) for the West Bear deposit. Results of two drillholes completed during the winter of 2004 and an earlier drilling campaign in 2002 suggest that the Gulf work may not have defined the boundaries of the West Bear deposit or accurately determined the uranium content. Further work is planned during the winter when the property is accessible. During the summer of 2004, a $400 000 program was planned for the Hidden Bay property to focus on defining drill targets on the Tent Seal trend, Miller-Dwyer lakes trend, the western Rabbit Lake fault trend and the Points Landing area. About 4800 m of drilling was planned for the Hidden Bay property.

In the northern part of the Basin, UEX has reported that three diamond drillholes totaling 2500 m were planned for the Riou Lake property to follow up on radioactive springs. An additional 3400 m of drilling for the Black Lake property, on which COGEMA holds a 30% interest, was in progress as a follow-up to drilling and geophysical surveys completed earlier in 2004. One of the new holes, DDH BL-18, intersected 0.6% uranium (0.7% U_3O_8) over 4.4 m, including a maximum grade of 1.66% uranium (1.96% U_3O_8) over 0.5 m. The mineralization is between 310 m and 315 m below surface and perched just above the Athabasca unconformity. Based on this intersection, UEX and COGEMA have staked new ground adjacent to the Black Lake property and proposed a further 8000 m of drilling.

UEX also gained the option to acquire a 25% interest in the Beatty River project from JCU (Canada) Exploration Company Ltd. COGEMA holds a 50.71% stake in the project and will remain the operator. An exploration program consisting of diamond drilling is planned for 2005.

Denison Mines Inc. has a 22.5% interest in the McClean Lake uranium operation that is currently producing 2300 t of uranium (6 million lb U_3O_8) in concentrates per year. Denison also has a 25.17% interest in the Midwest uranium project, 20 km west of the McClean Lake mine. An expanded exploration program on the property is planned for the winter of 2004-05. The main areas of focus will be basement-hosted mineralization, under or related to the existing unconformity-hosted mineralization; to the north of the deposit where an historic drillhole intersected 6.98% uranium (8.24% U_3O_8) over 3.8 m; and along a parallel conductor to the south. Denison has also concluded an agreement with COGEMA to earn up to a 22.5% interest in the Wolly property by spending $5 million over six years. The Wolly property comprises 23 700 ha and surrounds the McClean Lake operation. Denison has also reached an agreement to increase its stake in the Wheeler River property by an additional 20%, and thereby increase its ownership to 60%, by spending $3 million on exploration in the first three years of the agreement and a further $4 million in the final three years. The Wheeler River property is located south of the McArthur River mine and its geological setting is considered comparable.

In the southeastern part of the Basin, work continued at Moore Lake. Owner JNR Resources formed a new partnership with uranium refiner International Uranium Corp. (IUC) of Denver, Colorado, who signed a letter of intent to acquire a 75% interest in the project. The 2004 summer drill program at the Maverick zone yielded a significant improvement on the previously published best results. Drillholes DDH ML-54 and DDH ML-55 returned grades of 2.97% uranium (3.5% U_3O_8) over 5 m, including a 2.5-m interval with 5.52% uranium (6.52% U_3O_8), and an interval of 6.2 m of 4.36% uranium (5.14% U_3O_8), which included 4.4 m at 5.95% uranium (7.02% U_3O_8), respectively. Diamond drillhole DDH ML-48 intersected 4.7 m of 3.4% uranium (4.01% U_3O_8), including a 2.7-m interval at 5.69% uranium (6.72% U_3O_8). Diamond drillhole DDH ML-61 has a 10-m intersection of 3.41% uranium (4.03% U_3O_8) including a 1.4-m intercept of 16.91% uranium (19.96% U_3O_8). This intersection represents the widest high-grade mineralization reported from the Maverick zone. All of these drillholes are within 100 m to the west-southwest of DDH ML-25, the Maverick zone discovery hole. New EM and gravity surveys will also be completed, and similar work is planned for the Lazy Edward Bay property on which IUC also has a 75% option.

JNR Resources has 100% interest in a new Black Lake property that lies just to the east of the UEX-COGEMA Black Lake property. A 1400-line-km MEGATEM survey is planned for the property in late 2004. The 2005 drilling and geophysical surveys will be planned based on the results of this survey. An additional 17 500 ha of land, inferred to cover the strike extensions of conductors and geochemical anomalies, has been staked.

Southern Cross Resources has signed a letter of agreement with Pitchstone Exploration Ltd. to form a joint venture and earn a 50% interest in Pitchstone's portfolio of properties that includes Darby, Candle, Waterfound, Moon Lake and Lynx. As a prelude to drilling, a program of modern geophysical surveys will be completed on all of the properties.

Other companies new to the Athabasca Basin in 2004 include: CanAlaska Ventures, Trend Mining Company, Consolidated Abaddon Resources and Roughrider Uranium. Activities in 2004 included mainly staking and fund raising in order to fund new geophysical and diamond-drilling programs.

GLR Resources Inc. has renewed its uranium exploration efforts in the Beaverlodge district with its Contact Lake project. A program of airborne geophysics, geochemistry and surface prospecting has identified several prospective drill targets. Samples taken from an extensive vein system returned values of up to 1.5% uranium (1.77% U_3O_8) and 2.3 g/t gold. The Contact Lake deposit is near the unconformity between the unmetamorphosed but folded Martin Group and metamorphosed, highly deformed basement and may represent an earlier analog to unconformity deposits typical of the Athabasca Basin.

Diamonds: Fort-à-la-Corne District

Diamond exploration in the Fort-à-la-Corne district, located east-northeast of Prince Albert in central Saskatchewan, was vigorous in 2004. On October 29, 2004, more than 30 companies and individuals held in excess of 890 000 ha. Total expenditures are forecast at $17 million, up significantly from the actual total expenditure in 2003 of $12 million (**Figure 21**). Advanced programs include Shore Gold's underground bulk sampling project on the Star kimberlite and a major drilling and mini-bulk sampling program focused on high-priority kimberlites on the Fort- à-la-Corne Joint Venture property.

STAR KIMBERLITE

Shore Gold Inc. began shaft sinking on the Star kimberlite in 2003 with the goal of obtaining a 25 000-t bulk sample. The estimated budget for the program is $8 million and is dependent upon the amount of kimberlite processed.

The Star kimberlite, at the southeast end of the Fort-à-la-Corne kimberlite field, consists of diatreme and pyroclastic crater-facies rocks covering a footprint area of approximately 200 ha and ranging from 3 m to more than 540 m thick. Preliminary estimates of continuous diamond-bearing kimberlite are approximately 500 million tonnes (Mt) with an average thickness of 88 m and are based on a minimum cut-off thickness of 30 m.

Shore's program was designed to recover a parcel of at least 3000 ct of diamonds to enable an accurate valuation of stones. The company sank a 4.5-m-diameter vertical shaft and drifted in kimberlite to recover 25 000 t of kimberlite. The recovered kimberlite material is being processed on site in a modular treatment plant with a capacity of 10 tonnes/hour (t/hr).

Kimberlite is stockpiled in 200-t to 350-t batches. The batches are individually processed in the modular diamond recovery plant, which includes a Dense Media Separator (DMS), an X-ray sortex diamond collector and a grease table, to produce a diamond-rich concentrate that is sorted in a secure facility.

As of November 2, 2004, the total diamond recovery from the first 16 207 t of kimberlite had reached 18 399 stones with a total carat weight of 2122 ct for an average grade of 13.09 carats per hundred tonnes (ct/ht). Lateral drifts from the 235-m level accounted for approximately 50% of the tonnage of sample that had been processed. A total of 16 476 commercial-sized diamonds (not passing a 1.18-mm^2 mesh screen) weighing 2091 ct have been recovered. An additional 1923 stones (30.8 ct) have been recovered on a 0.85-mm^2 mesh. Early results indicated a significant difference in the diamond distribution between the deeper, early Joli Fou kimberlite and the shallower, late Joli Fou kimberlite. The late Joli Fou average macrodiamond grade was 4.3 ct/ht. The grade of the early Joli Fou, which accounts for 80% of the mass of the Star complex, was 16.5 ct/ht. Furthermore, the early Joli Fou exhibits a large variation in grade ranging between 9.19 and 33.1 ct/ht. The largest diamond recovered to date is a 19.71-ct aggregate from early Joli Fou kimberlite along the southeast drift on the 235-m level. The next largest stones, all recovered from the early Joli Fou, weigh respectively 19.68, 11.57, 10.14, 8.12, 8.08 and 8.07 ct. An internally flawless 4.77-ct octahedron has also been recovered.

In total, 104 diamonds weigh more than 2 ct each, 274 exceed 1 ct, and 638 are greater than 0.5 ct. Approximately 76% of the diamonds recovered are classified as white in colour, 13% as off-white and 11% as coloured. Of the coloured stones, 299 diamonds have been classified as yellow, pink, amber or green, accounting for 1.6% of the entire diamond parcel. Diamond valuations, the main objective of the bulk sample project, will be completed once the entire diamond parcel is collected, with average diamond valuations expected in the winter/spring of 2005. On November 9, 2004, Shore announced that mining of the bulk sample was complete and the targeted kimberlite mass of 25 000 t was on surface. Processing of the bulk sample was about 80% completed.

FORT-À-LA-CORNE JOINT VENTURE

In late 2003 and into the first half of 2004, the Fort-à-la-Corne Joint Venture (De Beers Canada Inc., operator [42.245%], Kensington Resources Ltd. [42.245%], Cameco Corporation [5.51%], and UEM Inc. [carried 10%]) reported results from 2002-03 drill programs and in the fourth quarter of 2003 completed a significant drill program on high-priority kimberlites.

The joint-venture property covers 61 drill-tested kimberlite bodies that constitute one of the largest kimberlite fields in the world. The bodies range from 2.7 to 250 ha in size based on geophysical modeling. The larger kimberlite bodies are commonly composite in nature and made up of multiple eruptive phases of mainly pyroclastic crater-facies deposits. Exploration activity over the past few years has focused on higher-priority kimberlites, including most recently the 140/141, 148 and 122 kimberlites.

The final results of the 2002 mini-bulk sampling program for the 140/141 kimberlite were released in October 2003. These results included the verification of a significantly higher-grade zone known as the kimberlite breccia unit. This unit had the best diamond recovery results with an estimated grade forecast of 15 ct/ht. Results also included updated modeled grades and revenues for distinct units in the 140/141 kimberlite body. Grade forecasts vary from 5 to 15 ct/ht while revenue estimates vary from US$67/ct to US$97/ct. Further work is required to increase confidence levels in grade and revenue forecasts for the 140/141 kimberlite because it has since been divided into numerous geological units.

In the final quarter of 2003, an intensive $3 million drill program was initiated. Forty-nine core holes totaling just under 10 000 m further delineated the 140/141, 148, 150 and 122 kimberlites. The additional drilling on 140/141 focused on the relatively higher-grade zone discovered in the 2002 drilling campaign. The program also included an airborne magnetic gradiometry survey over the entire property, which identified six new anomalies interpreted as kimberlite. On Janurary 26, 2004, Kensington Resources announced that a clear, high-quality, single-crystal octahedroid weighing 0.77 ct with all three dimensions over 4 mm was intersected while splitting core.

In early 2004, microdiamond recoveries were reported for the 148, 140/141 and the 122 kimberlites. Recoveries from the 148 kimberlite surpassed the stone abundance figures for all previous Fort-à-la-Corne samples. The average stone count was 2353 stones per tonne with individual phases within the kimberlite complex having in excess of 3000 stones per tonne. A sample of 595.15 kg of kimberlite from the 140/141 kimberlite yielded 1159 stones. The diamond distribution clearly correlates with kimberlite facies. The highest stone counts came from the repeated graded beds and the breccia beds. Sampling of the 122 kimberlite recovered 327 microdiamonds from 412.65 kg for an average stone count of 792.4 stones per tonne. These stone counts are significantly higher than similar historical sample recoveries on this body.

In the spring of 2004, the joint-venture partners completed a GEOTEM™ survey over their property in order to better understand the shape and size of the known kimberlites and to search for new, non-magnetic kimberlites. The survey covered 840 line-km with a flight line spacing of 300 m.

Gold

The recent rise in gold prices has been reflected by enhanced activity, particularly in the east-central part of the province. Gold exploration expenditures are forecast to exceed $6 million in 2004, a 52% increase compared with 2003 (**Figure 21**), and a sixfold increase from just three years ago. The steady increase in expenditures parallels the rise in gold price from the month-end close of US$277.00/oz on August 31, 2000, to the closing price of US$429.40/oz on October 29, 2004. Several junior exploration companies and small-capital mining companies are currently exploring in the La Ronge, Glennie and Beaverlodge domains.

More than half of the forecast gold exploration expenditures will be in the La Ronge Domain. Golden Band Resources Inc. has assembled, through staking and acquisition, a land package in excess of 73 500 ha that includes seven known gold deposits, four former producers, and a licensed gold mill. Previous operators had spent more than $50 million exploring the properties that now constitute Golden Band's La Ronge gold project since 1985. The project area represents a potential resource of more than 1 million oz of gold and a scoping study is planned to assess production potential. Exploration work also continues with the goals of expanding the resource base of known deposits and identifying new targets.

In 2004, exploration by Claude Resources Inc., near its Seabee mine in the Glennie Domain, has produced encouraging results, particularly at the West Porky zone. The company is aggressively exploring for additional shear-related, mineralized structures. Exploration expenditures on the Seabee area properties for 2004 are projected to total $1.7 million and will include approximately 28 000 m of surface diamond drilling. Targets include the West Porky main zone, the mineralized structures associated with the Porky Lake anticline, the East Pine Lake splay and two mineralized structures east of Santoy Lake.

In the northwestern part of the province, GLR Resources Inc. has acquired, since 1987, significant land positions in the Beaverlodge Domain for gold and PGE potential. GLR Resources Inc. is currently conducting a drill program in order to re-evaluate the resource within the historic Goldfields camp, southeast of Uranium City.

Most gold occurrences in the La Ronge, Glennie and Beaverlodge domains fall into the class of mesothermal vein deposits or orogenic lode gold deposits. Gold occurs within quartz veins and quartz vein stockworks commonly associated with shear zone systems. Nearly all deposits are hosted within plutons that fall within a late Trans-Hudson orogen age range of 1.86-1.8 billion years.

Base Metals

Limited exploration of volcanogenic massive sulphide (VMS) targets in the Flin Flon Domain continued in 2004. The McIlvenna Bay deposit remained dormant in 2004 but, on November 19, Foran Mining announced it had reached an agreement to re-acquire the property. Outside of the Flin Flon Domain, there was renewed exploration of the historic, sediment-hosted Janice Lake copper showings in the Wollaston Domain by Phelps Dodge Corporation of Canada Ltd. In the Glennie Domain, Golconda Resources flew an aeromagnetic survey over the copper- and zinc-poor VMS deposit discovered in 2001 and identified a number of potential targets along strike from the original deposit.

Mineral Production

Overview

In 2003, Saskatchewan's 28 mining operations produced 12 different commodities, including potash, salt, coal, uranium, gold, silver, copper, zinc, sodium sulphate, silica sand, clay and bentonite (**Figure 22**). Saskatchewan remains the world's largest producer of uranium and potash, producing approximately one-third of the world's primary supply.

In terms of non-fuel mineral production, Saskatchewan was the third largest producer in Canada, behind Ontario and Québec in 2003.

Saskatchewan mineral production in 2003 generated $2.48 billion worth of sales. In 2004, the projected value of mineral sales will be over $2.8 billion, reflecting increased commodity prices and production for potash and uranium.

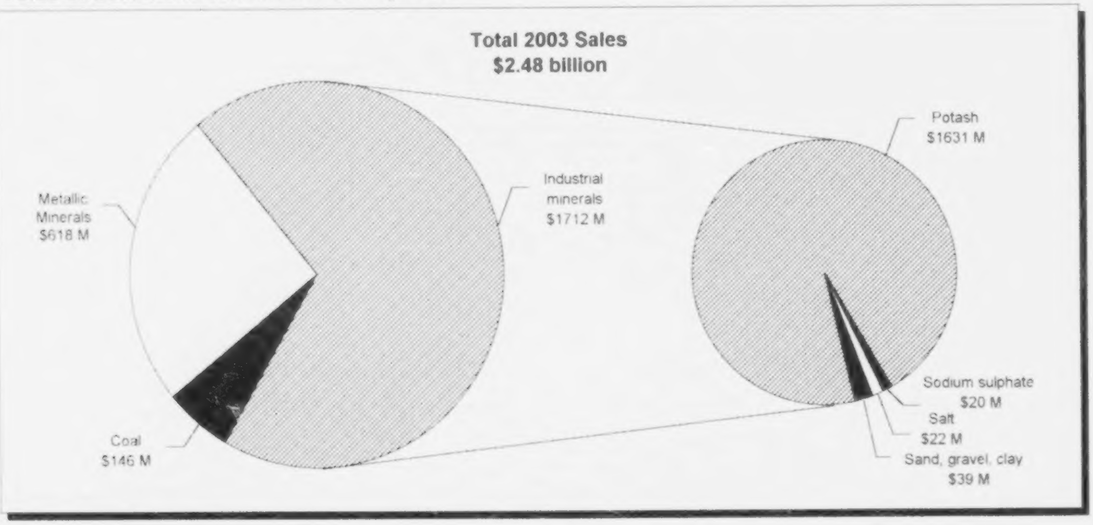
Industrial Minerals

Industrial minerals are a substantial component of the non-renewable resource sector in Saskatchewan. They have consistently accounted for between 20% and 50% of the gross value of provincial mineral production during the past 30 years. Not including coal, the four major products are potash, salt, sodium sulphate and aggregate, with minor production in structural clay, silica sand, clinker, a naturally fired brick made from mudstone, and bentonite. Potash production from 10 underground operations, including two solution mines, set an all-time high in 2003 at 14.4 Mt, an increase of some 8% from 2002 (12.9 Mt). The total value of industrial mineral production in 2003 was $1.7 billion (**Figure 22**).

Uranium

Uranium mining continued at two operations in 2004: the Eagle Point mine at Rabbit Lake and the McArthur River mine. Ore is processed at the Rabbit Lake mill for the former and at the Key Lake

Figure 22
Value of Saskatchewan Mineral Sales, 2003



Source: Saskatchewan Industry and Resources mill for the latter. In addition, processing of stockpiled ore in the Jeb mill at McClean Lake was ongoing. In the summer of 2004, a first-phase construction licence, which permitted work to begin on surface facilities, including a second head frame, was granted for the Cigar Lake mine site; it is anticipated that the second-phase construction licence will be received in late 2004 with start-up targeted for 2007 provided all of the necessary permits are received.

Global uranium industry leaders Cameco Corporation and COGEMA Resources Inc. operate all of the aforementioned mines and processing facilities and control most of the identified resources in the Basin. Cameco is also developing greater exposure to downstream profits in the power industry with a 31.6% interest in the Bruce Power Limited Partnership. Bruce Power is responsible for power generation from four Bruce B reactors and two Bruce A reactors. Together the six Bruce reactors will supply about 20% of Ontario's electricity.

Total production of uranium in 2003 was 10 463 t (27.2 million lb U_3O_8), down from the 2002 output of 12 684 t (32.98 million lb U_3O_8), largely due to the temporary shut-down at McArthur River and the cessation of mining and milling at the Cluff Lake mine. There was production from three operations in 2003. The McClean Lake operation continued to mill stockpiled ore from the Sue C deposit throughout 2003 and 2004. Mining of the Sue A orebody at McClean Lake is expected to begin in the summer of 2005; this will be followed, if regulatory approval is received, by the mining of the Sue E orebody. The operator, COGEMA, has applied to expand the Jeb mill at McClean Lake to receive Cigar Lake ore, probably in 2007. Despite the nearly four-month production interruption at McArthur River in 2003, it remained the province's largest producer. Ore from McArthur River was blended with low-grade mineralized waste rock and stockpiled at Key Lake before being milled at Key Lake. The Eagle Point underground mine at Rabbit Lake was fully operational in 2003, its first full year of production since mining was restarted in 2002. The spot price for uranium continued to rebound from the all-time low of US\$7.10/lb U_3O_8 at the end of 2000, reaching US\$20.25/lb U_3O_8 by October 29, 2004. This dramatic rise reflects mounting concerns about pending supply shortages.

McARTHUR RIVER

McArthur River is the largest high-grade uranium deposit in the world with proven and probable reserves of 167 898 t of uranium (436.5 million lb U_3O_8) and an average grade of 20.9% uranium (24.7% U_3O_8). Grades within the orebody are up to 59.4% uranium (70% U_3O_8) locally, and composite grades of 25.4% uranium (30% U_3O_8) over several metres in thickness are common. Uranium ore is structurally controlled by the P2N fault, which dips 45° to 60° to the southeast and has a 70-m average vertical offset of the Athabasca Group unconformity. Ore is hosted within Athabasca Group sandstone, the fault zone, and basement pelitic gneiss of the Wollaston Supergroup.

Production at McArthur River was suspended temporarily during the second quarter of 2003. Prior to the mining interruption, annual production was forecast at 7163 t of uranium (18.623 million lb U_3O_8); actual production was 5847 t of uranium (15.243 million lb U_3O_8). By comparison, total annual production in 2002 was just shy of 7500 t of uranium, with a total of 7111 t of uranium (18.489 million lb U_3O_8) produced from McArthur River ore and an additional 193 t of uranium (0.502 million lb U_3O_8) produced from stockpiled Key Lake ore.

RABBIT LAKE

The Eagle Point mine at Rabbit Lake completed its first full year of production in 2003 following the re-opening of the mine midway through 2002 by Cameco Corporation. Production for 2003 was 2269 t of uranium (5.9 million lb U_3O_8 at an average mill headgrade of 0.81% uranium [0.95% U_3O_8]). The Rabbit Lake facility is now the longest-running uranium mining-milling operation in Saskatchewan. Reserves, as of December 31, 2003, were 4808 t of uranium (12.5 million lb U_3O_8) and that ore is targeted to feed the mill facility until the start-up of the Cigar Lake mine, which is targeted for 2007.

McCLEAN LAKE

Milling of stockpiled ore continued in 2004 at the McClean Lake operation. Total production in 2003 was 2320 t of uranium (6.03 million lb U_3O_8) with a further 2308 t of uranium (6 million lb U_3O_8) targeted for production in 2004. The mill processed a blend of Sue low- to high-grade and JEB low-grade ores for an average of 1.75% uranium (2.0% U_3O_8). Sue C deposit ore now comprises the mill feed as ore from the JEB deposit was exhausted in September 2003. Stockpiled Sue C ore will continue to feed the mill until 2006. As of December 2003, reserves were 15 924 t of uranium (41.4 million lb U_3O_8) with an average grade of 1.36% uranium (1.6% U_3O_8). In order to process Cigar Lake ore, the expansion of the JEB mill has been proposed, allowing an increase in capacity from the currently licensed 3077 t of uranium (8 million lb U_3O_8) to 4154 t of uranium (10.8 million lb U_3O_8) initially. The expansion is expected to begin in 2005, allowing Cigar Lake ore to be processed early in 2007.

CIGAR LAKE

Cigar Lake is the world's second largest high-grade uranium deposit with total proven and probable reserves of 89 045 t of uranium (231.5 million lb U_3O_8) at an average grade of 16.17% uranium (19.07% U_3O_8). Total inferred resources are 45 465 t of uranium (118.2 million lb U_3O_8) at an average grade of 14.35% uranium (16.92% U_3O_8).

Under the terms of a first-phase construction licence granted in the summer of 2004, site preparation work continued at Cigar Lake. A licence for the second phase of construction is expected late in 2004, after which engineering and construction is expected to take 27 months. Underground mining is targeted to commence in 2007, pending completed regulatory approval and favourable market conditions. The total capital cost to put Cigar Lake into production is estimated at $350 million.

Gold

The Seabee mine (Claude Resources, 100%) is about 120 km north-northeast of La Ronge in the central part of the Glennie Domain. Mine development is taking place at the 570-m and 680-m levels. These developments will make available for shrinkage mining the higher-grade ore from the 2B and 2C zones. In 2004, the company upgraded the original tailings dam and completed the shaft extension to the 600-m level, allowing economical access to ore from 1000 m below surface. Currently, the company is stoping the 2B structure on the 650-m level and the 162 structure on the 550-m level.

The mine produced 50 800 oz of gold in 2003 and processed 94 125 t at 7.26 g/t gold (0.23 oz/ton) to produce 19 649 oz of gold in the first six months of 2004. A total of 96 627 t grading 8.24 g/t gold (0.26 oz/ton) was milled during the same time period in 2003 to produce 24 214 oz of gold. The forecast total production for 2004 is 45 000 oz.

The ore is processed in a two-stage grinding circuit, which is then followed by cyanide leaching. Mill upgrades and improvements produced a throughput of 209 000 t in 2003 at an average of 572 t/d. This compares to the original design capacity of 400 t/d. The average head grade processed during 2003 was 7.95 g/t gold (0.26 oz/ton) compared to 6.59 g/t gold (0.21 oz/ton) in 2002.

The total cash operating costs for the first half of 2004 were US$309/oz, up from US$269/oz during the first half of 2003. However, the average realized gold price for the first half of 2004 was US$400/oz as opposed to US$339/oz during the first half of 2003.

Since production began at Seabee in 1991, all mining has been carried out above the 680-m level. At September 30, 2004, life-of-mine production totaled 651 128 oz of gold from 2 663 774 t of ore processed, implying an average ore grade of 8.22 g/t gold (0.27 oz/ton). The company is developing on the 570-m and 680-m levels of the mine for the rest of the year. The annual Howe International Ltd. report, prepared in March 2004, established Seabee's total proven and probable reserves at 674 700 t grading 7.48 g/t gold (0.22 oz/ton). The audit also documented inferred resources of 1 987 000 t grading 8.45 g/t gold (0.25 oz/ton).

In 2004, Kristo Gold Inc. spent $2.2 million on the construction of a magnetic-gravity separator plant in order to recover gold, silver and copper from the tailings at the Anglo-Rouyn mine site, located 55 km northeast of La Ronge. Two feeder lines pump tailings from the pond through a series of magnetic separators, cones, spirals, and gravity tables. The plant is capable of processing 250 tons/hr and is expected to recover 70-80% of the gold, 50% of the silver, and 50% of the copper from the estimated 1.3 million tons of mine tailings with average grades of 0.016 oz/ton gold, 0.057 oz/ton silver, and 0.19% copper. The final concentrate can be directly smelted to bullion and the total production is expected to be 14 000 oz of gold.

Base Metals

On October 7, 2004, Ontzinc Corporation announced that it had entered into an agreement to acquire 100% of Hudson Bay Mining and Smelting (HBMS) from Anglo American International, S.A. (Anglo American) for the purchase price of $325 million, subject to final adjustment. Effective on closing of the transaction and subject to shareholder approval, Ontzinc will change its name to Hudbay Minerals Inc.

In 2004, base metals were produced exclusively from the Flin Flon Domain in the east-central part of the province. They were mined from the Konuto Lake deposit and that part of the Callinan deposit located in Saskatchewan. Both deposits are wholly owned by HBMS and both are VMS deposits of Paleoproterozoic age.

The Callinan deposit consists of three east-plunging zones (South, East and North) within a sequence of rhyolitic rocks that are likely equivalent to the host rock (mine rhyolite) of the Flin Flon mine. Only the upper part of the Callinan North deposit extends into Saskatchewan. Since start-up in April 1990 through 2003, the Callinan mine produced 6 462 556 t of ore grading 1.41% copper, 3.98% zinc, 2.14 g/t gold and 24.68 g/t silver. The Saskatchewan part accounted for 359 027 t grading 1.50% copper, 3.81% zinc, 1.70 g/t gold and 15.74 g/t silver. Saskatchewan production in the first eight months of 2004 was 23 716 t of ore grading 1.41% copper, 3.02% zinc, 1.58 g/t gold and 15.60 g/t silver from the North Zone lens. Production for the remainder of the year is estimated at 15 000 t of ore grading 1.20% copper, 2.98% zinc, 1.54 g/t gold and 16.46 g/t silver. As of January 1, 2004, mineable resources in the Saskatchewan part of the North zone were 364 160 t grading 1.21% copper, 3.15% zinc, 1.55 g/t gold and 19.06 g/t silver.

The Konuto Lake deposit is a mafic-hosted, back arc, rift-type copper-zinc VMS deposit. The north-northeast-striking, near-vertical-dipping, and steeply south-plunging deposit has a strike length of approximately 180 m. The copper-zinc-gold-silver mineralization occurs in five sulphide lenses, including four massive sulphide lenses (Lenses 1, 3, 4 and 5) located within a broad zone of oblique-reverse faulting. The ore is hosted by mafic metavolcanics and consists of sulphide breccias and stockwork ore types mainly composed of chalcopyrite-pyrrhotite-sphalerite and minor pyrite. The ore zones extend from 18 m to approximately 570 m below the surface.

At January 1, 2004, the deposit's proven and probable reserves stood at 500 000 t of ore grading 3.90% copper, 1.40% zinc, 2.10 g/t gold and 8.60 g/t silver and no mineable resources. Since production began in 1998, to the end of 2003, the mine produced 1 393 315 t of ore grading 4.37% copper, 1.47% zinc, 2.01 g/t gold and 8.83 g/t silver. Production for 2004 is estimated at approximately 326 586 t of ore, with an additional 235 889 t of ore to be mined in 2005 before the anticipated mine closure in the third quarter.

Saskatchewan Crown Land Tenure Activity

Mineral Dispositions

A total of 1037 new "metallic mineral" claims covering 438 819 ha were acquired in calendar year 2003. The majority (82%) of these claims were acquired in the surveyed part of the province and were related to diamond exploration. A total of 1017 metallic mineral dispositions totaling 579 170 ha lapsed in calendar year 2003. While the majority of these were in the southern/surveyed part of the province and related to speculative diamond staking, over half of the area that lapsed was in the northern part of the province.

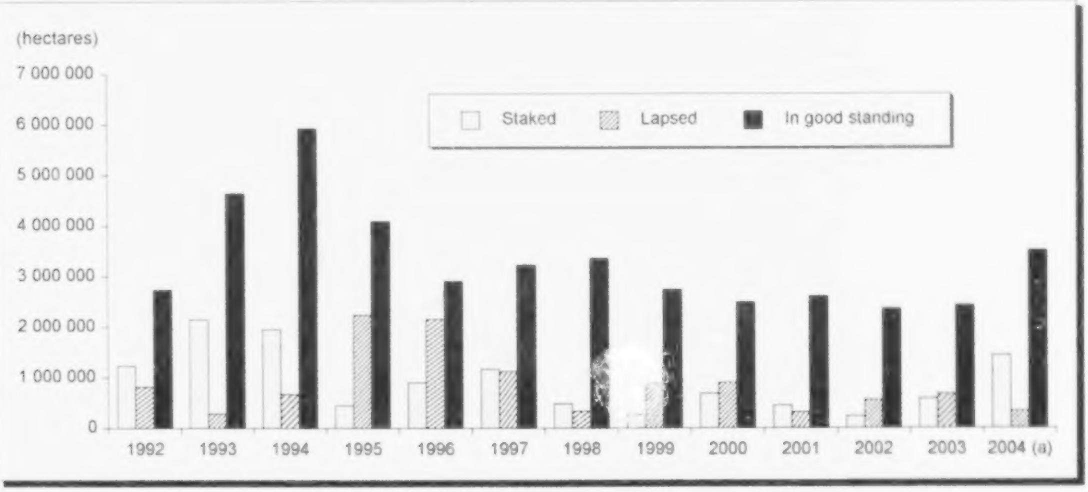
The total number of metallic mineral dispositions in good standing on December 31, 2003, was 3580 dispositions covering a total of 2.2 Mha (**Figure 23**).

A steady increase in the uranium price from US$13/lb to over US$20/lb, combined with promising diamond exploration results, has spurred increased staking activity in 2004. In the north, 420 new claims (1.1 Mha) have been acquired this calendar year, primarily related to uranium exploration activity in the Athabasca Basin, and 973 new claims (508 942 ha) have been acquired in the surveyed part of the province. This calendar year, to the end of November, 853 mineral dispositions totaling 498 420 ha have lapsed, with the majority of claims and area lapsing in the southern part of the province.

As of November 30, 2004, there were 4113 active mineral dispositions covering 3.2 Mha (**Figure 23**). Of these, 2252 dispositions covering 886 954 ha are related to diamond exploration in the surveyed southern half of the province (Prince Albert area) and 1861 dispositions covering 2.35 Mha are in the northern, unsurveyed part of the province.

An additional 39 permit applications totaling an additional 1.8 Mha and 163 claim applications totaling 606 187 ha are pending review. These applications are related to the uranium staking rush in the Athabasca Basin.

Figure 23
Saskatchewan Crown Mineral Lands Under Disposition, 1993-2004



Source: Saskatchewan Industry and Resources.
(a) The data for 2004 are current as of December 1, 2004, and include only the first nine months of fiscal year 2004/05.
Note: The data are presented on a fiscal-year basis.

The amount of land acquired and applied for in calendar year 2004 is more than 2.5 times the amount of land in good standing in calendar year 2003.

Table 15 shows the total number and types of active Crown metallic and industrial mineral dispositions at the end of November 2004 when 5052 mineral dispositions covered 3.45 Mha.

While representing the largest amount of land under disposition, the lower revenue related to metallic minerals acquired pursuant to The Mineral Disposition Regulations, 1986, reflects the 50% fee reduction that was implemented effective in 2001 to encourage exploration. Potash lease dispositions provided the majority of the mineral-derived revenue, followed by coal leases.

Assessment Work

In 2003, 1271 submissions of assessment work were reviewed and $24.9 million of expenditures were approved. Uranium-related assessment work represented 70.5% of the approved expenditures, while work related to diamond exploration activities represented 7.2% of approved expenditures. In the fiscal year, $24.7 million worth of work was applied to maintain dispositions in good standing.

To November 2004, over 700 submissions have been reviewed and $15.3 million of assessment work expenditures applied. Uranium-related assessment work represents an overwhelming 87% of the submissions to date. Diamond drilling constitutes the bulk of the approved expenditures, followed by ground geophysics. Approximately $22.2 million worth of approved work has been applied to maintain dispositions in good standing.

Government Incentive Programs

Saskatchewan Mineral Exploration Tax Credit (SMETC)

In December 2001, Saskatchewan introduced a new temporary 10% tax credit for flow-through-share investors in eligible mineral exploration companies. The program parallels the federal 15% Investment Tax Credit for Exploration (ITCE). The intention of the program is to stimulate grassroots mineral exploration, principally for metallic minerals (including diamonds). The non-refundable tax credit applies to eligible exploration expenses incurred on or after October 18, 2000, and before January 1, 2005. While there have been a number of administrative challenges, the SMETC is popular with industry and should reach the projected $300 000 annual allocation. Companies applying for permission to issue the tax credit are primarily focused on diamond and uranium exploration.

TABLE 15. SASKATCHEWAN MINERAL DISPOSITIONS

Category	November 2004		December 2003	
	(no.)	(hectares)	(no.)	(hectares)
Mineral claims	4 002	3 200 000	3 470	2 137 812
Mineral leases	109	31 160	110	31 193
Permits	2	25 600	–	–
Alkali leases	35	12 422	36	12 700
Coal leases	760	111 747	766	11 872
Quarry leases	115	3 744	107	4 005
Potash leases	12	217 728	12	217 728
Total	5 052	3 450 000	4 516	2 415 310

Source: Saskatchewan Department of Industry and Resources.
– Nil.

Saskatchewan Mineral Exploration Incentives

In September 2002, the Saskatchewan government announced a six-year, $12.6 million package of mineral exploration incentives that includes:

- Prospectors Incentive Program ($100 000/yr);
- Company Incentive Program ($1.1 million /yr);
- Enhanced Geoscience Funding ($400 000/yr) – Multi-parameter Airborne Geophysics;
- 10-year royalty holiday for new gold and base-metal mines;
- development of a competitive diamond royalty and tax structure; and
- a fuel tax rebate.

Corporation Exploration Incentive Program

This program offers reimbursement of up to 25% of approved eligible expenditures to a maximum of $100 000 per applicant, with a maximum of one approved project per applicant per year upon approval of a technical report and expenditure statement. In the 2003 program year, 24 companies with projects totaling $10.7 million applied for the program. Due to oversubscription, funding to companies was prorated. Each company received funding equal to approximately 79% of the initial amount requested. For the 2004 program year, there are 32 applicants with proposed exploration budgets totaling $17.6 million. Exploration programs are targeting a diversity of minerals over a wide geographic area of the province.

Prospectors Incentive Program (PIP)

This program offers reimbursement of up to 40% of approved eligible expenditures to a maximum of $7500 per applicant, with a maximum of one approved project per applicant per year upon approval of a technical report and expenditure statement. This program has not yet been fully subscribed to. This situation may relate to the low number of existing prospectors and the predominance of uranium and diamond exploration programs, which typically utilize geophysical methods rather than prospecting methods. In 2003, 12 applications for PIP, representing projects totaling $150 000, were received. For the 2004 program year, nine applications were received.

2.9 ALBERTA[18]

Overview

During 2004, approximately 4.7 million hectares (Mha) were staked in Alberta (**Table 16**). As of December 31, 2004, 6.3 Mha were in good standing. From December 31, 2003, to December 31, 2004, there was a net decrease of almost 4 Mha due to a large number of properties being dropped before the end of the 10-year permit term.

From January 1 to December 31, 2004, a total of $940 000 in mineral assessment work was filed and accepted by the Alberta Department of Energy, or has acceptance pending as of January 2005. This is much lower than the five-year high of $11.8 million filed and accepted in 2002, but higher than the $0.6 million in mineral assessment work filed and accepted in 2003. **Table 17** shows a breakdown of geophysical and drilling assessment work for the period 2002-04.

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[18] The Alberta review of activities was prepared by R.A. Olson, D.R. Eccles, W.A.D. Edwards, D. Pana and T. Berezniuk of the Alberta Geological Survey, Alberta Energy and Utilities Board. For more information, the reader is invited to contact Dr. Olson by telephone at (780) 427-1741 or by e-mail at reg.olson@gov.ab.ca.

TABLE 16. METALLIC AND INDUSTRIAL MINERALS PERMITTING ACTIVITY IN ALBERTA, 2002-04

Activity	2002	2003	2004
Claims staked (permits (1) applied for)			
Number of applications (no.)	522	322	533
Total area (Mha)	4.1	2.9	4.7
Permits in good standing			
Number of agreements (no.)	1 409	1 276	866
Active hectares (Mha)	11.2	10.2	6.3
Filed mineral assessment reports			
Number of reports (no.)	14	10	24
Number of permits represented (no.)	203	44	184
Hectares represented (Mha)	1.4	0.2	1.2
Expenditures filed ($ millions)	11.8	0.6	0.9

Source: Alberta Geological Survey, Alberta Energy and Utilities Board.
(1) In Alberta, mineral claims for exploration are called metallic and industrial mineral permits.

TABLE 17. GEOPHYSICAL AND DRILLING ASSESSMENT WORK IN ALBERTA, 2002 TO END OF DECEMBER 2004

Type of Work	2002	2003	2004 (1)
Geophysics			
Airborne geophysics (line-km)	11 536	–	14 027
Airborne geophysics expenditures (2) ($)	1 001 393	–	234 610
Ground geophysics (line-km)	804	62	7.4
Ground geophysics expenditures (2) ($)	1 387 730	95 621	25 430
Drilling			
Metres drilled (m)	33 880	497	496
Number of drillholes (no.)	375	12	6
Drilling expenditures filed (2) ($)	7 341 408	114 151	198 630

Source: Alberta Geological Survey, Alberta Energy and Utilities Board.
– Nil.
(1) The data reported for 2004 are from only 15 of the 24 mineral assessment reports filed in 2004. (2) The totals are based on expenditures that were filed but not necessarily approved.

While diamondiferous kimberlites continue to be a popular exploration target, the past year has shown growing interest in ferrous minerals, largely due to favourable metal prices and international demand for iron for steel making.

Diamondiferous Kimberlites

During 2003, a diamond joint-venture project between partners Ashton Mining of Canada Inc. (the operator), EnCana Corporation and Pure Gold Minerals Inc. discovered two new diamondiferous kimberlites (K296 and K300) in the western part of the Buffalo Head Hills kimberlite field in north-central Alberta. As well, in late 2003, Ashton undertook a 10 500 line-km airborne electromagnetic/magnetic survey that identified several new targets. During 2004, detailed geophysical surveys were completed over approximately 10 of these anomalies and drilling, which was originally scheduled for fall 2004, was postponed pending further interpretation of the geophysical results.

Other areas in Alberta with recent publicly available diamond-related assessment filings include: the Slave Lake/Swan Lake and greater Buffalo Head Hills area; the St. Paul and Two Hills area of east-central Alberta; and the Clear Hills area of northwestern Alberta. Finally, summer 2004 field results are pending and assessment work filings are anticipated for several properties in northern Alberta. These filings will probably include work conducted on ground surrounding Ashton's Buffalo Head Hills diamond play, south of the Birch Mountains kimberlite field and in the Peace River area.

Precious, Base and Ferrous Metals

Ferrous minerals generated significant exploration interest in Alberta during the past year with several deposits poised for production. In 2004, Coremetric Development Corp. commenced mining iron from a heavy minerals deposit in the Pelican mountains, 200 km north of Edmonton. The surface operation will produce 40 000 to 50 000 t/y of iron that will be crushed on site and sent to Inland Cement Limited for use as an aggregate in cement making.

In southwestern Alberta, Micrex Development Corp. submitted a proposal for the development of the Burmis magnetite deposit, which is located on the eastern slopes of the Livingstone Range. Micrex proposes a quarry that would produce approximately 40 000 t/y of high-grade, finely ground magnetite. The magnetite would be used as a heavy media for coal beneficiation at nearby coal processing plants in Elk Valley, British Columbia.

The Clear Hills iron resource in northwestern Alberta continues to be of potential interest. Prior work identified an iron resource of over 1 billion tonnes at a grade of about 35% FeO (ferrous oxide) in one or more ferroan oolitic ironstone deposits within the Late Cretaceous Badheart formation. In addition to the deposit's potential as a source of iron, some recent work has focused on possible co-products, such as precious metals. Further geoscience and exploration work is needed in the Clear Hills region to better define the geometry of the iron resource(s) and particularly to identify a potential iron reserve, as well as to address the previously reported complex metallurgy.

Due to the interest in the large Clear Hills iron resource, there also has been renewed interest in coal in this area (as a possible energy source for any future iron resource development). Two interrelated companies, Clear Hills Iron Ltd. and Peace River Energy Ltd., both of which are Canadian subsidiaries of the U.S. company Goldspring Inc., have been particularly active in the Clear Hills region during 2004. As well, the Alberta Geological Survey (AGS) initiated a multi-year project during 2004 intended to provide data and information that will continue to stimulate both iron and coal resources exploration and development in this region.

Energy Minerals (Uranium and Thorium)

Uranium continues to be of exploration interest, particularly in northeastern Alberta. Due to the doubling of the market price of uranium since 2002, there was increased staking for uranium within Alberta during 2004, with most of this being in the northeastern part of the province. In mid-2004, Cogema Resources, a subsidiary of the French company AREVA Group, obtained two permits needed for the decommissioning of its Cluff Lake mine in the western part of the Athabasca Basin in Saskatchewan. In Alberta, Cogema continues to act as operator for the Maybelle River uranium project, which is in the westernmost part of the Athabasca Basin about 150 km north of Fort McMurray. Cogema had drilled at the Maybelle uranium prospect in 2002 and 2003, and was planning an expanded drilling program in 2004. However, the 2004 program at Maybelle River was placed on hold due to a still-unresolved dispute with a local First Nations community.

Industrial Minerals and Aggregates

Birch Mountain Resources has recently commenced producing limestone in northeast-central Alberta, near Fort McMurray, with the production intended mainly as construction aggregate for the oil sands projects. Birch Mountain estimates that, once in full operation, production will be approximately 7 Mt/y of limestone. The area was converted from mineral permit to mineral lease for this project, and this accounted for much of the increase in the area of the province under metallic and industrial mineral lease.

Titanium Corporation Inc. has been evaluating the feasibility of extracting metallic minerals from Syncrude Canada's oil sands tailings under a two-year exclusivity agreement with Syncrude signed in June 2003. Syncrude's centrifuge tailings plant concentrates these minerals from an initial amount of less than 15% to between 20% and 30% in a tailings stream that is now going straight into a tailings pond and thus is being lost. In September 2004, Titanium Corporation Inc. announced success in separating titanium-bearing minerals from a 3000-t stockpile of tailings at its pilot plant at the Regina Research Park in Saskatchewan. The pilot plant, which has both wet mill and dry mill separation components, can process up to 5 tonnes of oil sands tailings per hour. The company is also testing the separation of zircon, which is favoured by unusually low levels of uranium and thorium. The plan is to produce 200 000 to 300 000 t/y of minerals. Recently, Titanium Corporation indicated that it hoped to start commercial production in association with the Syncrude operation in the Fort McMurray area.

2.10 BRITISH COLUMBIA[19]

Summary and Outlook

Exploration spending in British Columbia has been accelerating over the past three years (**Figure 24**). As shown in **Table 18**, annual percentage increases from 2001 to 2004 were 35%, 59% and an estimated 72%. Total spending in 2004 will exceed $100 million. This level of expenditure has not been reached in over half a decade.

It is generally recognized that exploration investment is influenced by: 1) the presence of recent world-class discoveries, 2) increasing mineral commodity price levels, 3) high mineral endowment, and 4) a friendly and internationally competitive regulatory environment.

British Columbia is currently benefiting from all of these factors. The discovery of high-grade copper-gold mineralization in the Northeast zone at the Mount Polley mine has caused a significant re-focus of exploration on porphyry deposits in British Columbia. Prices of the province's major mineral products, namely copper, gold, molybdenum and metallurgical coal, are up substantially.

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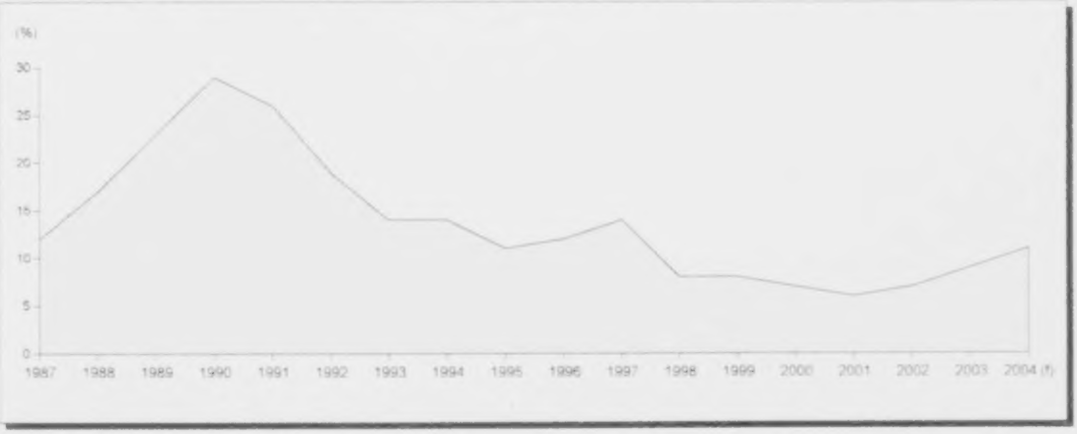
[19] The British Columbia review of activities was prepared by Jim Lewis. For more information, the reader is invited to contact Mr. Lewis by telephone at (250) 952-0521 or by e-mail at jim.lewis@gems3.gov.bc.ca.

Figure 24
British Columbia's Exploration Expenditures as a Percentage of Canada's Total Expenditures, 1987-2004



Source: British Columbia Ministry of Energy and Mines
(f) Forecast of intentions

TABLE 18. EXPLORATION EXPENDITURES IN BRITISH COLUMBIA, 1997-2004

	1997	1998	1999	2000	2001	2002	2003	2004 (f)
Spending ($ millions)	115.2	54.5	41.3	35.9	29.1	39.2	62.5	107.3
Percent change (%)	. .	-53	-24	-13	-19	+35	+59	+72

Source: British Columbia Ministry of Energy and Mines.
. . Not available; (f) Forecast of intentions.
Notes: All figures include exploration and deposit appraisal (and exclude mine complex development). In addition to field work and overhead expenditures, statistics include engineering, economic and feasibility studies, environmental and land access spending. All statistics are referenced from the official federal-provincial/territorial Survey of Mineral Exploration, Deposit Appraisal and Mine Complex Development Expenditures (actual 1997 to 2003 and forecast of intentions (f) in mid-2004). The official statistics from this survey are the source for Statistics Canada's National Accounts.

British Columbia's Geological Survey Branch has established an outstanding geoscience database to support exploration activities and the government is continuously developing additional legislation and programs oriented to expanding the exploration and mining sector.

British Columbia's share of Canadian exploration spending has been steadily increasing over the past four years and will exceed 10% in 2004. While far from the peak of almost 30% of Canada's spending achieved in the early 1990s, it is anticipated that the momentum of world demand for minerals and the friendly provincial regulatory environment will maintain or increase this market share in the foreseeable future.

Government Initiatives

Since being elected to office in 2001, the current provincial government has taken aggressive steps to move British Columbia towards being the most attractive jurisdiction in Canada for exploration and mining. Some of the objectives addressed and/or accomplished in 2004 include:

- The appointment of a Minister of State for Mining, who can focus directly on the unique needs of the exploration and mining industries, as an important adjunct to the Minister of Energy and Mines;
- The development of a comprehensive Mining Plan for British Columbia that sets out four planning cornerstones:
  - Focus on communities and First Nations,
  - Protecting workers and the environment,
  - Global competitiveness, and
  - Access to land;
- The extension of the 20% flow-through-share tax credit for mining exploration for an additional year to December 31, 2005. Combined with the federal government's 15% mining tax credit, this creates one of the best exploration tax credit programs in Canada;
- The enhancement of the provincial geoscience database with new geological mapping and regional geophysical surveys, and extension of free access to provincial geochemical data, interactive maps and mineral occurrence databases to attract new mineral exploration and mining development and create new jobs;
- The implementation of Mineral Titles Online, a system that enables clients to secure mineral claims through Internet map selection rather than physical on-the-ground claim staking;
- The streamlining of regulations to reduce mining-related regulations by 30% and the introduction of fast-track major project approval for qualified proponents;

- The organization of Joint Solutions workshops to bring together representatives from the mining industry and provincial government agencies to develop new ways to respect interests in Crown land while still encouraging mineral exploration; and

- The amendment of the *Coal Act* and *Mineral Tenure Act*, resulting in a more streamlined regulatory environment to support the growing mining industry.

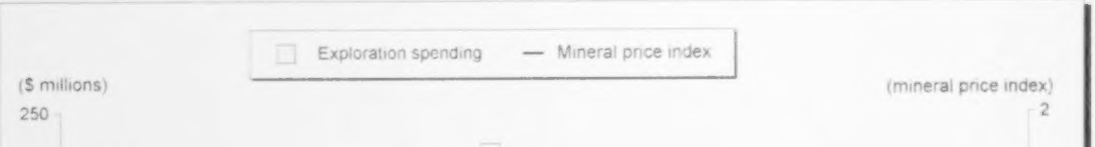
Statistical Trends In British Columbia's Exploration Sector

The acceleration of exploration spending since 2001 is highly correlated with rapid increases in mineral prices, as shown by the latest three years of **Figure 25**. In this figure, the British Columbia Mineral Price Index is made up of the seven most important mineral commodities in the province (i.e., gold, silver, copper, molybdenum, zinc, lead and metallurgical coal [with the exception of construction aggregates]). The graph covers a 25-year period and supports the strong tie between mineral commodity prices and exploration expenditures. Also significant is the fact that spending in British Columbia in 2004 finally exceeded the 25-year average.

Figure 26 illustrates the five-year performance of copper, gold, zinc, molybdenum and coal prices and demonstrates that, while prices remained relatively flat from 1999 to 2001, they began to accelerate between 2001 and 2004 (on the figure, molybdenum is off scale in 2004 with an index value of 552). **Table 19** highlights the substantial price increases since 2001, where four of these five commodities show double-digit percentage increases. There is no doubt that mineral demand from the rapid expansion of China's construction and manufacturing economy, along with other strong world economies and a weaker U.S. dollar, have driven these price levels up. More importantly however, the increase in demand for minerals from both developed and developing countries and from the extraordinary boost in China's economic growth is projected to continue, at least in the short to medium term. This demand bodes well for exploration in British Columbia.

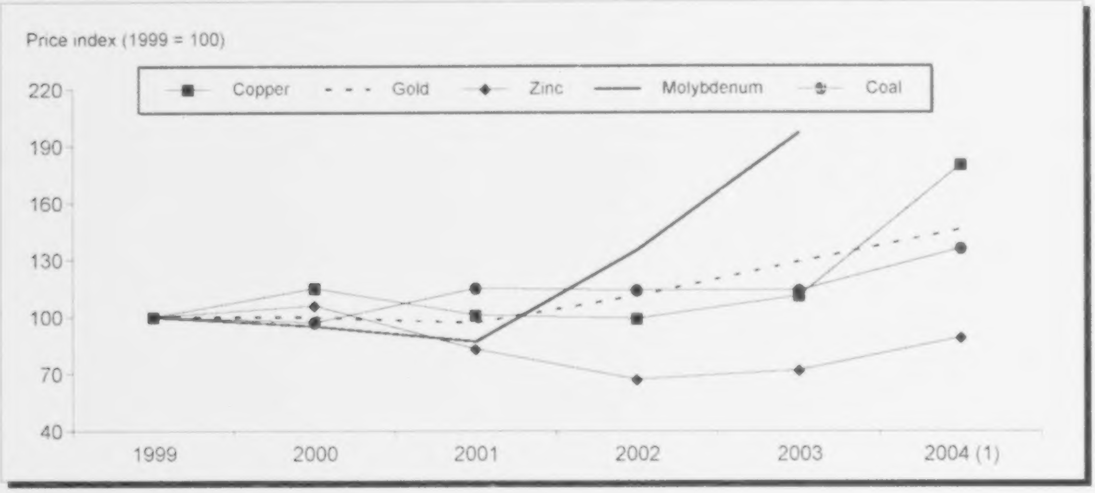
Figure 27 compares exploration spending with other historical indicators of exploration activity, including claim units staked, Free Miner Certificates issued, and Notices of Work (permit

Figure 25
Annual Exploration Expenditures and British Columbia's Mineral Price Index, 1979-2004



Source: British Columbia Ministry of Energy and Mines.
Note: Exploration expenditures for 2004 are based on a revised forecast of intentions.

Figure 26
Mineral Commodity Price Levels, 1999-2004 (1999 = 100)



Source: British Columia Ministry of Energy and Mines.
(1) The index value for molybdenum in 2004 is 552.

TABLE 19. INCREASES IN THE PRICE OF SELECTED MINERAL COMMODITIES, 2001-04

Mineral Commodity	Price Increase
	(%)
Molybdenum	533
Copper	78
Gold	50
Coal	18
Zinc	7

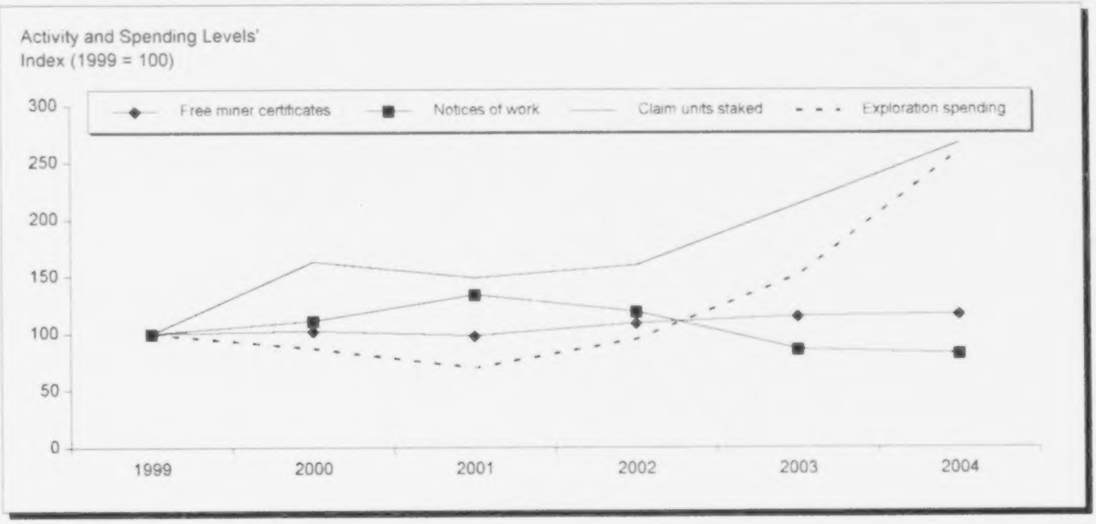
Source: British Columbia Ministry of Energy and Mines.
Note: The price of molybdenum is based on the price of MoS_2.

applications) submitted. As can be expected, there is a high correlation between claims staked and exploration spending and a lesser correlation with certificates issued. The lower increase in Free Miner Certificates suggests that the province's cadre of prospectors, geologists and junior mining companies has remained ready to accelerate exploration activity as more financings are completed and more dollars become available to them.

The strong growth in new claims staked is a healthy indicator in a mining economy. It suggests that new ground and lesser-known prospects with longer-term potential are also being examined, along with the well-known prospects and existing properties with more immediate mine re-start potential. The explanation for the fall-off in Notices of Work is still not verified; however, streamlining legislation and policy has eliminated the requirements for submitting Notices of Work for exploration and placer mining, which are safe and have low environmental risk.

Figure 27

Exploration Activity in British Columbia as Indicated by Free Miner Certificates, Claim Units, Notices of Work and Exploration Spending, 1999-2004 (1999=100)



Source: British Columia Ministry of Energy and Mines.
Note: Exploration spending in 2004 is based on a revised forecast of intentions.

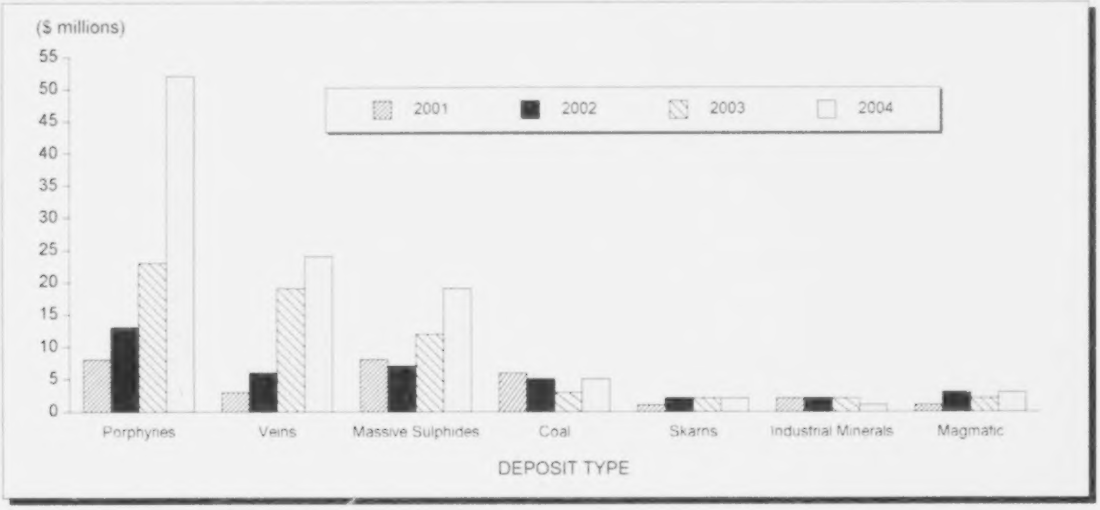
Exploration spending on the more significant deposit types is shown in **Figure 28**. Two trends stand out. First, there have been strong increases in spending over the past four years on the metallic deposits (i.e., porphyries, veins and massive sulphides).

Secondly, the high expenditures in 2004 on porphyries skews the graph and is equal to more than 80% of 2003's total exploration spending in British Columbia. This reflects the "pizzazz" factor of world-class discoveries. Two significant exploration findings at Mount Polley have sparked renewed interest in the province's porphyry deposits. First, higher-grade (than previously mined) gold-copper deposits were discovered. Second, drilling below previously mined and identified mineral zones has confirmed the existence of higher-grade mineralization at depth. With numerous porphyry occurrences in the province, these discoveries, along with increasing gold and copper prices, have attracted over $50 million to porphyry deposits exploration.

Also worth noting on this graph is the estimated 80% increase in coal exploration spending between 2003 and 2004. With strong demand for more steel production worldwide, metallurgical coal prices have more than doubled in the past year. Recently signed high-price contracts, some for 10-year durations, indicate that coal exploration and development will continue to be strong for at least the foreseeable future.

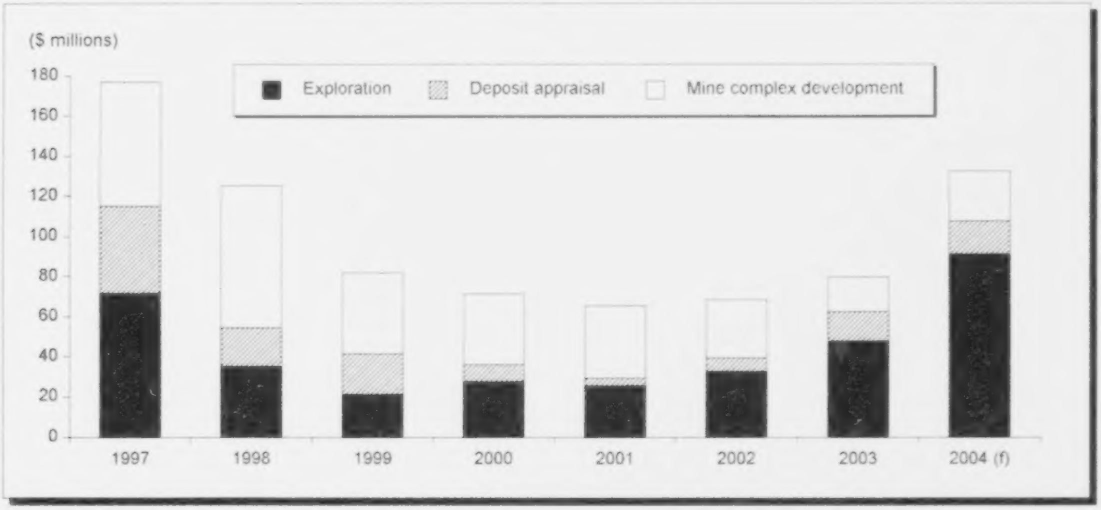
A balance in spending across: 1) mine complex development to extend current mines, 2) deposit appraisal to develop new mines in the near term, and 3) exploration to find and delineate deposit potential for longer-term developments is critical for a sustainable, healthy mining economy. **Figure 29** shows the distribution in spending amongst these categories in recent years. What is important here is the trend of increasing exploration, over the past four years, which is a prerequisite for sustaining future long-term developments. Exploration's share of total spending has moved from a low of 26% in 1999 to an estimated 69% in 2004. This shift in spending is important to compensate for under-expenditure on exploration over much of the last decade.

Figure 28
Exploration Spending in British Columbia, by Deposit Type, 2001-04



Source: British Columbia Ministry of Energy and Mines.

Figure 29
Exploration Spending in British Columbia, by Work Phase, 1997-2004



Source: British Columbia Ministry of Energy and Mines.
(f) Forecast.

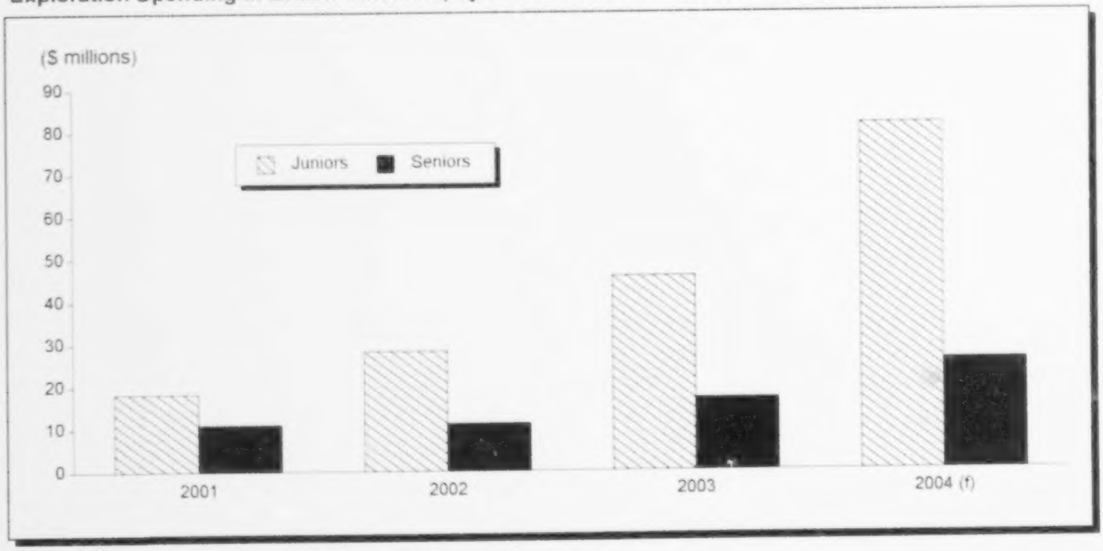
Similarly, the trend of increasing junior mining expenditures as shown in **Figure 30** bodes well for exploration that could result in a new generation of mines in British Columbia. The combined efforts of juniors and seniors will ensure continuing restoration of depleted reserves and the development of new discoveries over the longer term. As deposit finders, junior mining companies are important to the long-term growth and sustainability of a region's mining economy. Senior companies are important as mine developers and operators. Over the last three years, juniors have increased their spending from about two to three times that of seniors. British Columbia has a large number of resident junior companies and a core group of seniors. Taken globally, many jurisdictions suffer from a scarcity of resident junior mining companies that can stimulate grassroots exploration almost immediately as mineral prices increase.

The amount of spending per company and the number of companies operating in British Columbia are plotted in **Figure 31**. The trends of these parameters once again show the acceleration of exploration spending in recent years. The estimated $666 000 per company average for 2004 represents substantial expenditures. This may reflect (see also **Table 20**) the fact that, when strong mineral demand and prices appear after many years of decline, large sums are spent to move "shelf inventory" of known deposit reserves into production. While there is a strong trend to short-term mine developments in British Columbia, the increases in exploration spending, compared with deposit appraisal and mine complex development spending, assure the province of its potential for discovering and mining new deposits over the longer term as well.

Exploration Highlights

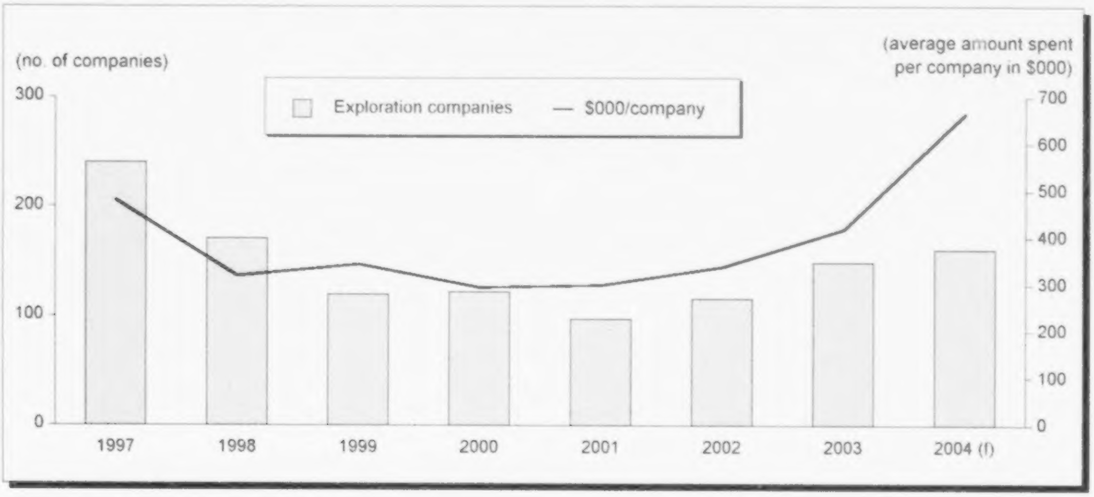
Strong international demand for minerals leading to higher commodity prices has provided an important driving force behind British Columbia's recent accelerated exploration spending. In addition, the industry recorded significant mineral financings early in the year, supported by the Mining Exploration Tax Credit Program and the Exploration Investment Tax Credit for flow-through investors. It is anticipated that this momentum will have further impact on continued exploration spending and mine openings and re-starts in 2005 and beyond.

Figure 30
Exploration Spending in British Columbia, by Junior and Senior Companies, 2001-04



Source: British Columbia Ministry of Energy and Mines.
(f) Based on a revised forecast of spending intentions.

Figure 31
Number of Exploration Companies and Average Amount Spent Per Company, in British Columbia, 1997-2004



Source: British Columbia Ministry of Energy and Mines.
(f) Forecast of intentions.

In 2004, over 200 independent prospectors and exploration and mining companies explored between 400 and 500 properties in British Columbia. The rapid increases in exploration spending every year since 2001 (see **Table 18**), and particularly the estimated 72% increase in exploration to over $100 million in 2004, is beginning to show results in terms of newly started operations and potential mines.

Table 20 attempts to portray these results by grouping new mining operations resulting from recent exploration efforts and significant exploration projects into four categories. The table shows six newly operating mines, eleven projects grouped in the "Mine Could Operate in 1 to 5 Years" category and an additional twelve projects assessed in the "Pre-Feasibility Stage or Better" group. In a fourth group, a number of projects are listed that are considered to have strong deposit potential and currently attract large exploration expenditures. **Figure 32** maps out the location of these newly operating mines and significant exploration projects. These and many other exploration projects are described in the B.C. Ministry of Energy and Mines' publication *British Columbia Mineral Exploration Review – 2004*, also found on the ministry's web site at www.em.gov.bc.ca/Mining/Geolsurv/Publications/catalog/catexrev.htm.

As an example of positive results in the metals sector, the significant expansion of gold-copper mineralization in the Northeast zone of the Mount Polley mine and below its Springer deposit has led Imperial Metal Corporation to announce the re-opening of its mine in early 2005. The positive results have highlighted the renewed potential for gold-copper open-pit mines throughout the province. As a direct result of the Mount Polley discovery, Fjordland Exploration Inc. discovered potentially significant gold-copper mineralization at depth on its Woodjam property.

Similarly, for coal, an important highlight was the opening of Pine Valley Mining's Willow Creek mine, the first new metallurgical coal mine in British Columbia in 20 years. As demand for seaborne metallurgical coal expands and as Australia's supply problems persist, exploration spending for coal has shown a significant increase. Spot prices rose to a peak of about US$160/t and several annual contracts for producer coal in 2005 are coming in at US$125/t (f.o.b. Pacific). This doubling of the price within a year provides a strong incentive for a number of companies to expedite their plans for coal exploration and mine development in the province.

TABLE 20. ADVANCED-STAGE EXPLORATION PROJECTS AND RECENT MINE DEVELOPMENTS IN BRITISH COLUMBIA, 2004

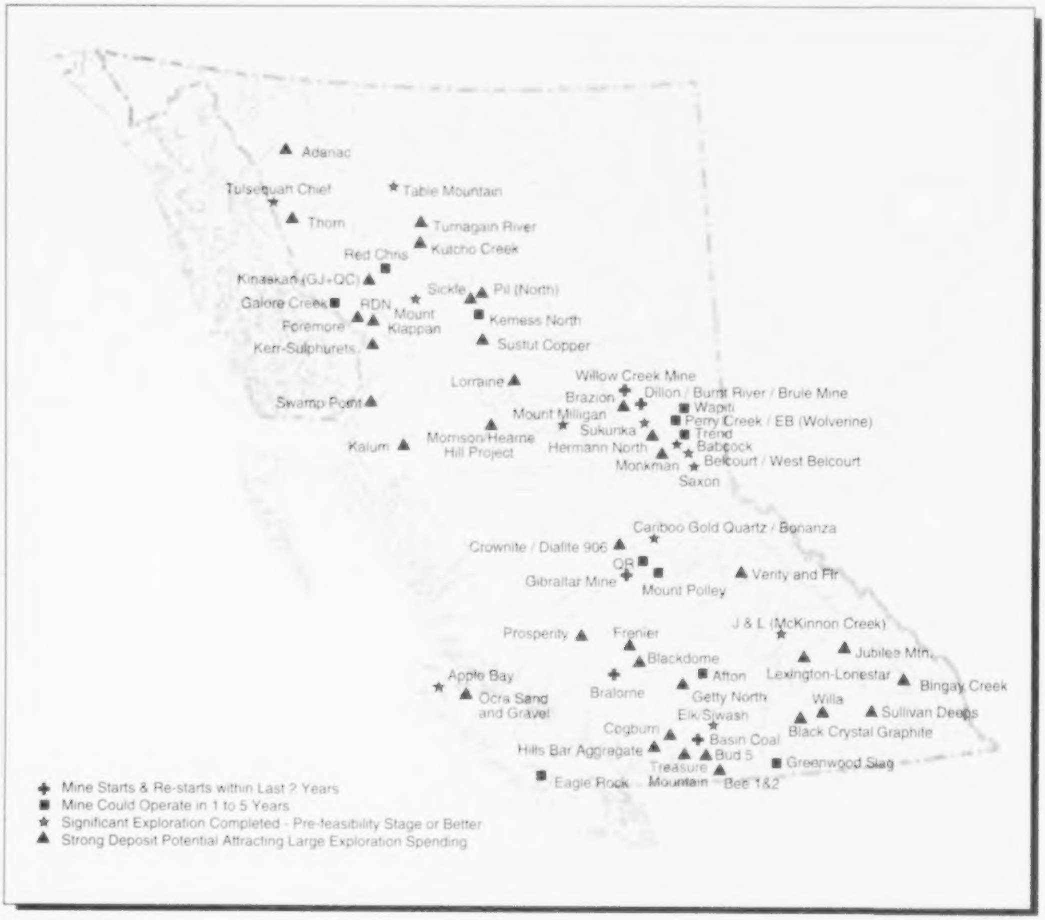
Sector	Exploration Project/Operation	Company/Operator	Commodity	Deposit Setting
Mine Starts and Re-Starts (Within Last 2 Years)				
IM	Apple Bay	Electra Gold Ltd.	Silica, kaolin	Industrial mineral
Coal	Basin Coal	Compliance Energy Corporation	Coal-thermal	Coal
Metal	Bralorne	Bralorne-Pioneer Gold Mines Ltd.	Au	Vein-mesothermal
Coal	Dillon/Burnt River/Brule	Western Canadian Coal Corp.	Coal-PCI	Coal
Metal	Gibraltar	Taseko Mines Ltd.	Cu, Mo	Porphyry
Coal	Willow Creek	Pine Valley Mining Corporation	Coal-PCI	Coal
Mine Could Operate (In 1 to 5 Years)				
Metal	Afton	DRC Resources Corp.	Cu, Au	Porphyry
Agg.	Eagle Rock	Eagle Rock Materials Ltd.	Crushed rock	Construction aggregate
Metal	Galore Creek	NovaGold Resources Inc.	Cu, Au, Ag	Porphyry
IM	Greenwood Slag	J. Falkoski	Slag-smelter	Recycle slag
Metal	Kemess North	Northgate Minerals Corp.	Cu, Au	Porphyry
Metal	Mount Polley	Imperial Metals Corp.	Cu, Au	Porphyry
Coal	Perry Creek/EB (Wolverine)	Western Canadian Coal Corp.	Coal-met.	Coal
Metal	QR	Cross Lake Minerals Ltd.	Au	Skarn
Metal	Red Chris	bcMetals Corp.	Cu, Au	Porphyry
Coal	Trend	NEMI Northern Energy and Mining Inc.	Coal-met.	Coal
Coal	Wapiti	Aurora	Coal-thermal	Coal
Significant Exploration Completed (Pre-Feasibility Stage or Better)				
Coal	Belcourt/West Belcourt	Western Canadian Coal Corporation	Coal-PCI	Coal
Metal	Cariboo Gold Quartz/Bonanza	International Wayside Gold Mines Ltd.	Au	Vein-mesothermal
Metal	Elk/Siwash	Almaden Minerals Ltd.	Au	Vein-mesothermal
Metal	J & L (McKinnon Creek)	BacTach Mining Corp.	Au, Ag, Cu, Zn, Pb	Sedimentary exhalative
Coal	Monkman	Elk Valley	Coal-PCI	Coal
Coal	Mount Klappan	Fortune Minerals Limited	Coal-anthracite	Coal
Metal	Mount Milligan	Placer Dome Inc.	Cu, Au	Porphyry
Coal	Saxon	NEMI Northern Energy and Mining Inc.	Coal-PCI	Coal
Coal	Sukunka	Talisman	Coal-PCI	Coal
Metal	Table Mountain	Cusac Gold Mines	Au	Vein-mesothermal
Metal	Tulsequah Chief	Redfern Resources Ltd.	Cu, Au, Zn, Ag	Volcanogenic massive sulphide
Strong Deposit Potential (Attracting Large Exploration Spending)				
Metal	Adanac	Adanac Gold Corp.	Mo	Porphyry
Coal	Babcock	Elk Valley	Coal-met.	Coal
IM	Bee 1&2	Western Industrial Clay Products Ltd.	Zeolite	Industrial mineral
Coal	Bingay Creek	Hillsborough	Coal-met	Coal
IM	Black Crystal Graphite	Crystal Graphite Corp.	Flake graphite	Industrial mineral
Metal	Blackdome	J-Pacific Gold Inc.	Au	Vein-epithermal
Coal	Brazion	Western Canadian Coal Corporation	Coal-PCI	Coal
IM	Bud #5	Western Industrial Clay Products Ltd.	Bentonite, zeolite	Industrial mineral
Metal	Cogburn	Leader Mining International Inc.	Magnesium, PGE	Magmatic-PGE
IM	Dialite 906	Dialite Industries Ltd.	Diatomite	Industrial mineral
Metal	Foremore	Roca Mines	Zn, Pb, Ag, Ba	Volcanogenic massive sulphide
IM	Frenier	BBF Resources Inc.	Perlite	Industrial mineral
Metal	Getty North	Getty Copper Corp.	Cu	Porphyry
Coal	Hermann North	Western Canadian Coal Corporation	Coal-PCI	Coal
Agg.	Hills Bar Aggregate Quarrying Project	Qualark Resources Inc.	Crushed rock, Au	Construction aggregate
IM	Jubilee Mtn.	Tiger Ridge Resources Ltd.	Barite	Industrial mineral
Metal	Kalum	Eagle Plains	Au, Ag	Vein-mesothermal
Metal	Kerr-Sulphurets	Noranda/Seabridge	Au, Ag	Porphyry
Metal	Kinaskan (GJ+QC)	Canadian Gold Hunter	Cu, Au	Porphyry
Metal	Kutcho Creek	Western Keltic Mines Inc	Cu, Zn, Ag, Au	Volcanogenic massive sulphide
Metal	Lexington-Lonestar	Gold City Industries	Au, Cu	Vein-mesothermal
Metal	Lorraine	Eastfield Resources Ltd.	Cu, Au, Ag	Porphyry
Metal	Morrison/Hearne Hill Project	Pacific Booker Minerals Inc.	Cu, Au	Porphyry
Agg.	Orca Sand and Gravel	Polaris Minerals Corp.	Sand and gravel	Construction aggregate
Metal	Pil (North)	Finlay Minerals	Cu, Au	Porphyry
Metal	Prosperity	Taseko Mines Ltd.	Cu, Au	Porphyry
Metal	RDN	Northgate/Rimfire	Au, Ag	Volcanogenic massive sulphide
Metal	Sickle	Stealth Minerals	Au, Ag	Vein-epithermal
Metal	Sullivan Deeps	Stikine Gold	Zn, Pb, Ag	Sedimentary exhalative
Metal	Sustut Copper	Northgate Minerals Corp.	Cu, Ag	Redbed
Agg.	Swamp Point	Ascot Resources	Sand and gravel	Construction aggregate
Metal	Thorn	Rimfire/Cangold	Cu, Au, Ag	Vein-epithermal
Metal	Treasure Mountain	Huldra Silver	Ag, Pb, Zn	Vein-mesothermal
Metal	Turnagain River	Hard Creek Nickel	Nickel	Magmatic-nickel
IM	Verity and Fir	Commerce Resources Corp.	Tantalum, niobium	Industrial mineral
Metal	Willa	Orphan Boy Resources Inc.	Cu, Au	Porphyry

Source: British Columbia Ministry of Energy and Mines.

Ag Silver; Agg. Construction aggregates project; Au Gold; Ba Baryum; Coal-met. Metallurgical coal; Coal-PCI Pulverized coal injection; Cu Copper; IM Industrial mineral; Mo Molybdenum; Pb Lead; PGE Platinum Group Elements; Zn Zinc.

Note: The project list was developed from publicly available data and from company contacts, up to December 2004.

Figure 32
Advanced-Stage Exploration Projects and Recent Mine Development in British Columbia, 2004


Adanac
Tulsequah Chief
Table Mountain
Thorn
Turnagain River
Kutcho Creek
Red Chris
Kinaskan (GJ+QC)
Sickle
Pil (North)
Galore Creek
RDN
Mount Klappan
Kemess North
Foremore
Kerr-Sulphurets
Sustut Copper
Lorraine
Willow Creek Mine
Brazion
Dillon / Burnt River / Brule Mine
Wapiti
Swamp Point
Mount Milligan
Perry Creek / EB (Wolverine)
Sukunka
Trend
Kalum
Morrison/Hearne Hill Project
Hermann North
Babcock
Monkman
Belcourt / West Belcourt
Saxon
Cariboo Gold Quartz / Bonanza
Crownite / Diatite 906
QR
Gibraltar Mine
Mount Polley
Verity and Fir
J & L (McKinnon Creek)
Prosperity
Frenier
Jubilee Mtn.
Blackdome
Apple Bay
Afton
Lexington-Lonestar
Bingay Creek
Ocra Sand and Gravel
Bralorne
Getty North
Willa
Elk/Siwash
Sullivan Deeps
Cogburn
Black Crystal Graphite
Basin Coal
Hills Bar Aggregate
Bud 5
Treasure Mountain
Greenwood Slag
Eagle Rock
Bee 1&2
✚ Mine Starts & Re-starts within Last ? Years
■ Mine Could Operate in 1 to 5 Years
★ Significant Exploration Completed - Pre-feasibility Stage or Better
▲ Strong Deposit Potential Attracting Large Exploration Spending

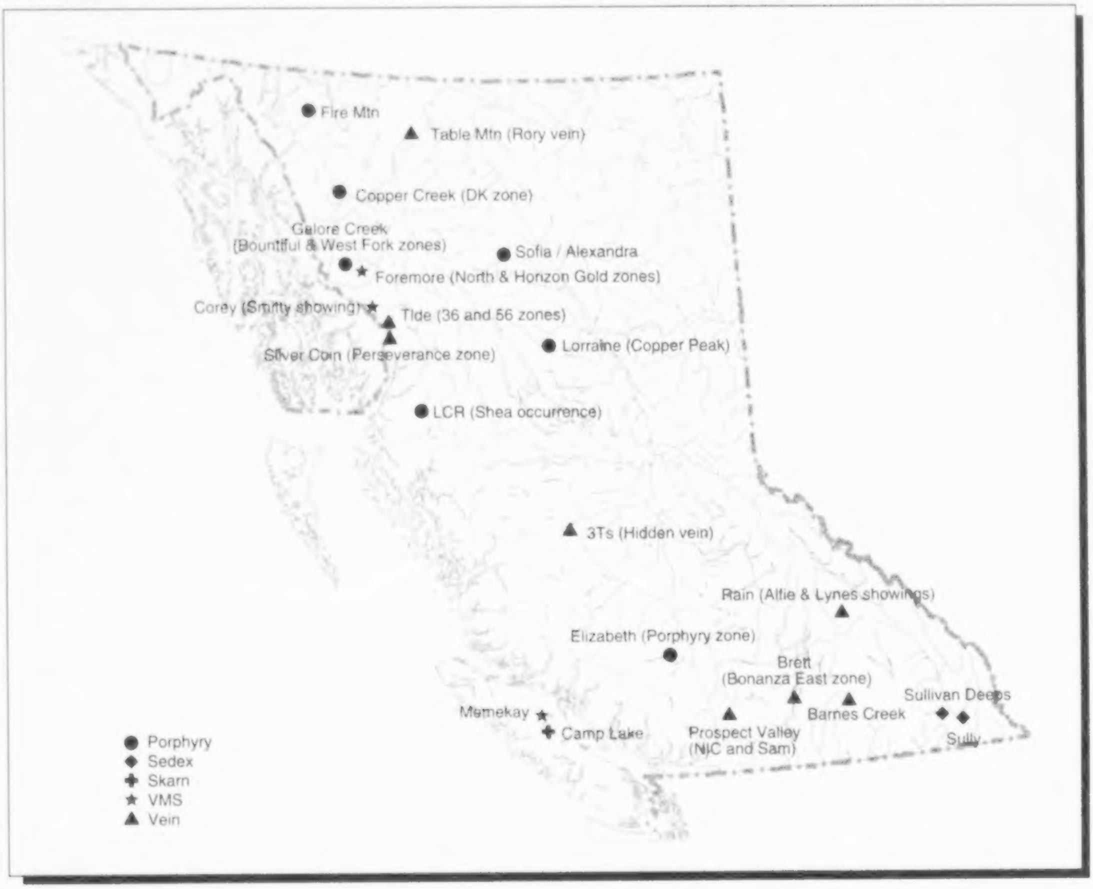
Source: British Columbia Ministry of Energy and Mines.

Both industrial minerals and construction aggregates are an increasingly significant component of international trade in British Columbia. The proximity and access of deposits to deep-water shipping provide strong exploration incentive for targeting these minerals. The most economically significant industrial minerals in British Columbia are magnesite, white calcium carbonate, limestone, silica, dimension stone, gypsum and sulphur. Commodities produced in lesser quantities include nephrite jade, magnetite, dolomite, barite, volcanic cinder, flagstone, industrial and medical/cosmetic clays, tufa, fuller's earth, bentonite, slag, mineral wool, roofing granules, graphite, and gemstones. There are many opportunities for future development.

Exploration efforts were rewarded with new discoveries in 2004. **Figure 33** highlights a number of the more significant discoveries.

Exploration in 2005 is projected to continue with vigour based on very positive trends in 2004 in terms of exploration spending, company financings, drilling programs, and new discoveries and successes, with several advanced exploration projects and newly operating mines.

Figure 33
New Discoveries in British Columbia, 2004


Fire Mtn
Table Mtn (Rory vein)
Copper Creek (DK zone)
Galore Creek
(Bountiful & West Fork zones)
Sofia / Alexandra
Foremore (North & Horizon Gold zones)
Corey (Smitty showing)
Tide (36 and 56 zones)
Silver Coin (Perseverance zone)
Lorraine (Copper Peak)
LCR (Shea occurrence)
3Ts (Hidden vein)
Rain (Alfie & Lynes showings)
Elizabeth (Porphyry zone)
Brett
(Bonanza East zone)
Sullivan Deeps
Barnes Creek
Memekay
Camp Lake
Prospect Valley
(NIC and Sam)
Sully
● Porphyry
◆ Sedex
✚ Skarn
★ VMS
▲ Vein

Source: British Columbia Ministry of Energy and Mines.

Conclusions and Future Outlook

Accelerating exploration spending in British Columbia for three straight years has produced a momentum whereby new mine operations are coming on stream and exciting new projects are moving forward. Many of these potential mines show expectations for development in the next one to five years. If mineral price levels remain reasonably high, there is no doubt that exploration in British Columbia will continue at these elevated spending levels. Spending could even increase further as land-use decisions are finalized, First Nations treaties are negotiated, other government initiatives are completed, and more discoveries are made.

If for some reason the "China factor" and other international market phenomena driving mineral demand fail, or more likely pause temporarily, the sustaining momentum of accelerating exploration spending in the province over the past three years should ensure continued activity at or above historic levels.

Opportunities abound. Mount Polley has opened up an intriguing question as to how many more high-grade porphyry deposits exist at depth. Growing California aggregate markets and demand for minerals from Pacific Rim countries, which have insatiable long-term appetites for minerals, provide

Figure 32
Advanced-Stage Exploration Projects and Recent Mine Development in British Columbia, 2004

Source: British Columbia Ministry of Energy and Mines

Both industrial minerals and construction aggregates are an increasingly significant component of international trade in British Columbia. The proximity and access of deposits to deep-water shipping provide strong exploration incentive for targeting these minerals. The most economically significant industrial minerals in British Columbia are magnesite, white calcium carbonate, limestone, silica, dimension stone, gypsum and sulphur. Commodities produced in lesser quantities include nephrite jade, magnetite, dolomite, barite, volcanic cinder, flagstone, industrial and medical cosmetic clays, tufa, fuller's earth, bentonite, slag, mineral wool, roofing granules, graphite, and gemstones. There are many opportunities for future development.

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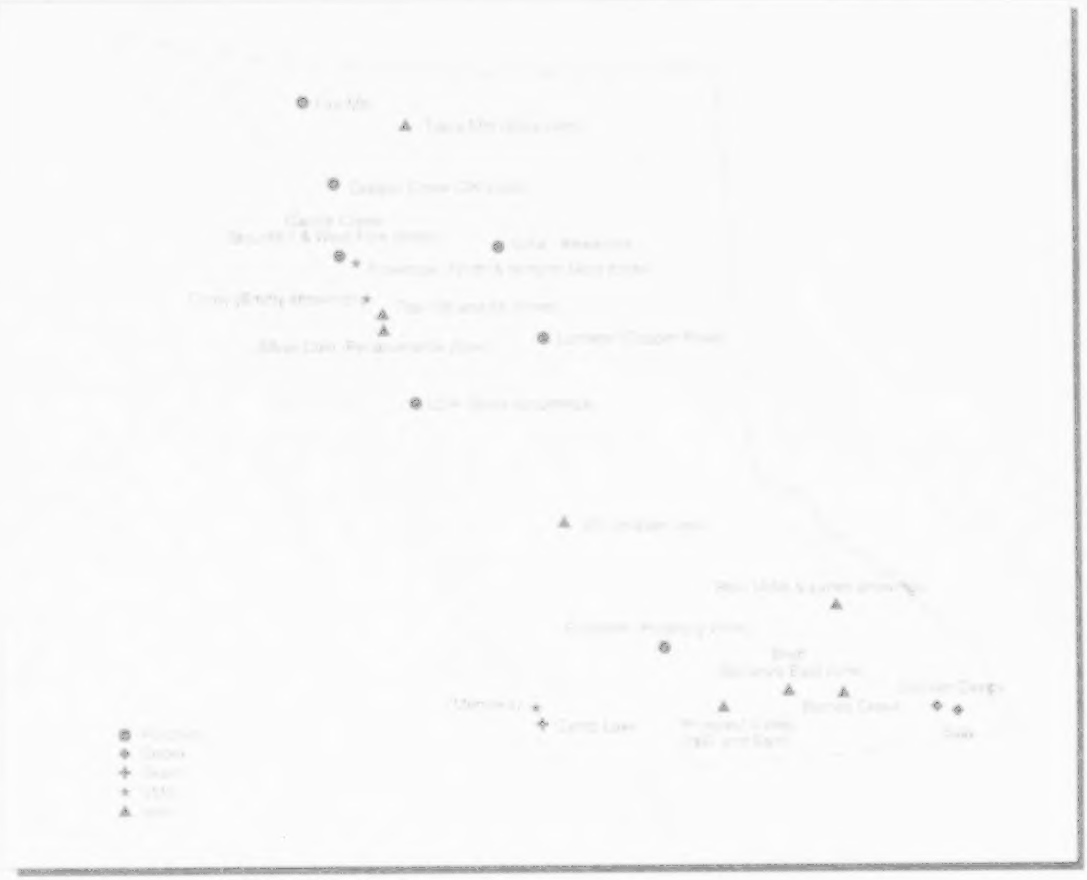

Source: British Columbia Ministry of Energy and Mines

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Opportunities abound. Mount Polley has opened up an intriguing question as to how many more high-grade porphyry deposits exist at depth. Growing California aggregate markets and demand for minerals from Pacific Rim countries, which have insatiable long-term appetites for minerals, provide strong incentive to develop and export minerals from the province. A continuous stream of new government initiatives focuses on improving the province's competitive position and attracting exploration and mining investment. Finally, the high mineral potential associated with well-endowed Cordilleran terranes is the strongest assurance of British Columbia's continued position as a significant exploration and mining jurisdiction.

2.11 YUKON[20]

2004 Overview

Mineral exploration in the Yukon increased dramatically in 2004 with estimated total expenditures of $22 million, compared to the $13 million spent in 2003. Approximately 60% of expenditures were for gold exploration, 25% for base-metals (mainly zinc, copper and lead) exploration, and 15% for the search for gemstones.

The exploration industry in the Yukon continues to be dominated by junior mining companies, which accounted for 90% of total exploration expenditures. However, several major mining companies, including Kennecott Canada Exploration Ltd., Newmont Mining Corporation, Northgate Mineral Corporation and Teck Cominco Limited, are also involved in exploration projects.

The number of new mineral claims staked also rose substantially in 2004; the 9061 claims staked during the year is nearly a threefold increase over the 2003 total of 3571. The total number of claims in good standing increased to 49 772.

Mines and Mine Development

Unfortunately, the Yukon currently has no operating hard rock mines. Current or anticipated mining development projects in the Yukon include the Wolverine zinc-copper-lead-silver-gold project (for which mine permitting is under way), the Carmacks copper-gold project (for which an application for a mining permit is expected), and the Minto copper-gold-silver and Keno Hill silver-lead projects (which are for sale).

Placer Mining Industry

Approximately 500 people were directly employed at 163 placer mines in 2004 and at least several hundred more were employed in businesses and industries that serve the placer mining industry. Most of the placer operations are small and family-run with an average of three or four employees.

The majority of active placer mining operations were in the Dawson mining district (116), followed by the Whitehorse mining district (25) and the Mayo mining district (21). One operation was reported to be active in the Watson Lake mining district.

The Yukon's total placer gold production in 2004 was 101 108 crude oz (3 144 800 g), compared to 50 888 crude oz (1 582 800 g) in 2003. The value of this 2004 gold production was $42.9 million. It should be noted that over 20 000 oz (600 000 g) was reported as royalties in March; this probably reflects 2003 production and may have inflated the apparent production for 2004 for some areas.

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[20] The Yukon review of activities was prepared by Mike Burke. For more information, the reader is invited to contact Mr. Burke by telephone at (867) 667-3202 or by e-mail at Mike.Burke@gov.yk.ca.

Exploration

Gold exploration continued to be led by the search for intrusion-related gold deposits, mainly related to mid-Cretaceous plutons in the Tombstone Gold Belt portion of the Tintina Gold Province. Although this belt of gold occurrences as a whole is perceived to be at an advanced stage of exploration, the reality is quite the opposite. There are advanced projects within the belt, but only six properties have received over 5000 m of drilling.

Some of the more advanced projects include the Brewery Creek mine and the Red Mountain project, where exploration has been ongoing since the early 1990s. StrataGold Corporation recently acquired the Dublin Gulch deposit and the Clear Creek property, two advanced properties within the belt that have numerous high-quality exploration targets and potential for resource expansion. However, the two properties have remained dormant since 1996 and 2000, respectively.

The belt also has many properties, such as the Mahtin and Heidi properties, that have excellent drill targets yet they have never had a single drillhole. New targets that have just received their first drilling are highlighted by the program at Antimony Mountain where porphyry-style mineralization with very little alteration in a Cretaceous Tombstone intrusion was tested.

Companies and prospectors have expanded the search for gold in the Yukon, looking for various deposit types such as gold-rich porphyry targets in the Stewart River area south of Dawson and in the Dawson Range Mineral Belt; orogenic gold veins in the White River and surrounding areas and in the Klondike; and epithermal gold-silver mineralization at the Grew Creek deposit near Ross River.

Base-metal exploration also mounted a significant comeback in 2004. The Finlayson Lake Volcanogenic Massive Sulphide (VMS) district was the focus of renewed exploration after a lull of several years. The largest program in the district was conducted by Expatriate Resources Ltd. on its Wolverine deposit. Early in the year, Expatriate purchased joint-venture partner Atna Resources Ltd's interest in the Wolverine joint venture to own 100% of the project. The company is advancing the project to a bankable feasibility and production decision in 2004-05.

Teck-Cominco renewed its exploration efforts in the Finlayson Lake district by optioning a block of land known as R-15 from the Kaska Mineral Development Corporation (KMDC). The KMDC was able to obtain a five-year lease on the land, with the permission of the Ross River Dena Council (RRDC), from the Yukon government. The block was interim-protected since 1983 as part of the RRDC land claim. Thus, this agreement could not have been completed before devolution. Iron oxide-copper-gold deposits were also a favoured target for base-metal exploration in 2004 with several programs examining occurrences within Proterozoic inliers in north-central Yukon.

Exploration for coloured gemstones, mainly emeralds, continued at significant levels in 2004. True North Gems Inc. completed a large program of bulk sampling, core drilling and prospecting on the Tsa da Glisza project (formerly called Regal Ridge) in the Finlayson Lake district. Several companies were also active in the area, continuing the search for additional emerald deposits.

A more comprehensive overview, highlighting a number of exploration projects conducted in the Yukon during the 2004 field season, is available on the Yukon Geological Survey web site at www.geology.gov.yk.ca. Detailed property descriptions are commonly available on company web sites and in documents filed electronically for the System for Electronic Document Analysis and Retrieval (SEDAR) at www.sedar.com. Yukon MINFILE, the Yukon's mineral occurrence database, also contains detailed descriptions of many of the occurrences described herein. This database is available on CD-ROM and also on the Yukon Geological Survey's web site.

Yukon Geological Survey

The Yukon Geological Survey (YGS) is in its second year as part of the Minerals Development Branch of the Department of Energy, Mines and Resources. The YGS is co-managed by Grant

Abbott and Rod Hill and has a staff of 24 employees. The Geological Survey of Canada (GSC) also maintains an office with the YGS.

Funding for the YGS remains close to the same level it has been over the past few years. This year, in addition to its core budget, the YGS obtained additional short-term funding from the federal Department of Indian Affairs and Northern Development (DIAND), through the Northern Geoscience and Knowledge and Innovation Funds, and from Natural Resources Canada, through the Targeted Geoscience Initiative (TGI).

The YGS completed a successful, but challenging, field season that saw widespread and prolonged forest fires interfere with several projects. The year 2004 included a greater diversity of work that reflects the YGS's new mandate. According to this mandate, the YGS's role is to support hydrocarbon development and meet increased demands for baseline data (to address environmental and development issues), while continuing to support its primary client, the mineral industry. Projects included 1:50 000-scale bedrock mapping, mineral deposit studies, surficial studies and mapping, regional stream sediment geochemistry, topical geology studies, and a regional seismic study. In addition, several office-based projects were undertaken to advance the Yukon Geoscience Database.

Yukon Mining Incentives Program (YMIP)

The Yukon Mining Incentives Program (YMIP) is administered by Ken Galambos. In 2004, funding was offered to 66 of 78 applicants for a total of $1 046 500. Nine of the successful applicants were in the Grassroots-Prospecting module, three in the Grassroots-Grubstake module, 21 in the Focused Regional module, and 33 in the Target Evaluation module. Yukon-based individuals or companies represented 73% of these applicants.

With the surge in the price of gold, there was a corresponding surge in precious-metal exploration. A full 70% of successful applicants were exploring for the yellow metal, which included 20% who were exploring for alluvial gold. Of the remaining 30%, base-metal (primarily copper) exploration programs accounted for 27% and two applicants explored for gemstones or other commodities.

Information Management and Distribution

With the increasing volume of information generated by the YGS and others, and rapidly evolving digital technology, the YGS has placed more effort and resources into making geological information more accessible. A large part of its effort has gone into developing and maintaining key databases and making all of its information accessible on the Internet. Ongoing activities include support for the H.S. Bostock Core Library and the Energy, Mines and Resources (EMR) library (Elijah Smith Building).

2.12 NORTHWEST TERRITORIES[21]

Introduction

The Northwest Territories constitutes 13.48% of Canada's total landmass and its geological record spans billions of years. The territory is richly mineralized, hosting a wide variety of commodity types. For many years, precious- and base-metal mines formed the mainstay of the territories' mining industry. However, the industry is now centred on the emerging diamond mines, which are set to play a major role in the territories' economy for many years to come.

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[21] This review was prepared by the Minerals, Oil and Gas Division of the Department of Resources, Wildlife and Economic Development, Government of the Northwest Territories. For more information, the reader is invited to contact Christy Campbell by telephone at (867) 920-3345 or by e-mail at christy_campbell@gov.nt.ca.

On April 1, 1999, the territory of Nunavut came into existence, along with the new Northwest Territories. Ekati, Canada's first diamond mine, reached full production during the same year. Diavik, Canada's second diamond mine, commenced operations in January 2003.

Mineral Production Summary

The total value of metal and diamond shipments from the Northwest Territories increased to \$1.767 billion in 2003 from \$848 million in 2002. This increase can be attributed to the rise in diamond production (11.2 million carats versus 4.9 million carats, respectively), partially offset by a slight decrease in diamond value on average. The total value of gold shipments was about \$45 million in 2003, a 20% decrease from 2002. A small amount of silver was also produced.

Diamond shipments accounted for 97% of the total value of metal and nonmetal production in the Northwest Territories in 2003, with gold essentially making up the remainder. The Northwest Territories accounted for 100% of Canadian diamond production and for some 2% of gold production during the same period. In addition, in 2003, the Northwest Territories' diamond production accounted for 7.5% of the world's total by weight and over 12% by value. The Con gold mine and the CanTung tungsten mine ceased production on November 28 and December 5, 2003, respectively.

Producing Mines

There are currently two operating mines in the Northwest Territories, the Ekati and Diavik diamond mines. The two gold mines, Con and Giant, ceased operations on November 28, 2003, and July 7, 2004, respectively, bringing to a close 66 years of gold mining in Yellowknife. The operator of the Giant mine, Miramar Mining Corporation, will keep the mine site on care and maintenance status for another six months. Subsequent to this, the Department of Indian and Northern Affairs Canada (INAC) will initiate remediation of the site.

On June 1, 2004, De Beers' Snap Lake diamond mine received a Class A water licence, the final regulatory instrument required for operation of the Snap Lake mine. Construction of the mine is expected to start in 2005 after full mobilization to the site over the 2005 winter road, and full production is expected to begin in 2007.

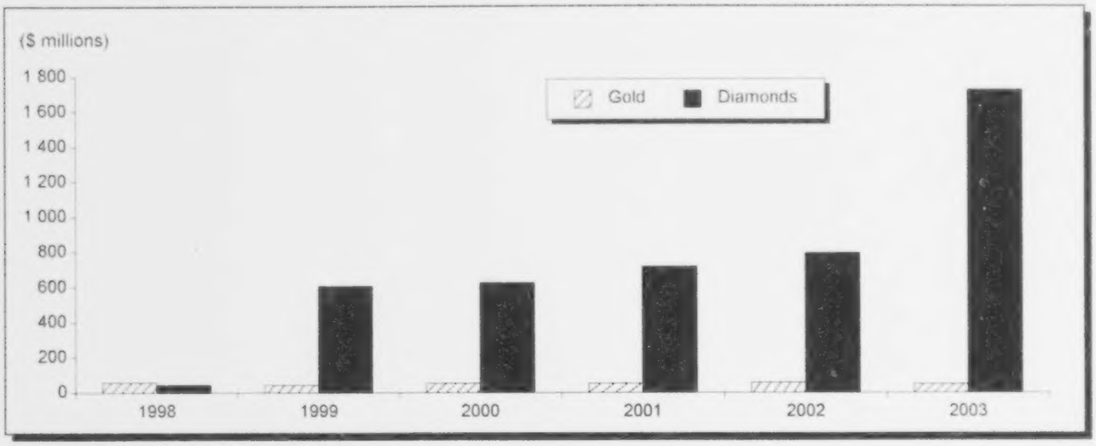
North American Tungsten Corporation's (NAT) CanTung tungsten mine shut down again in December 2003 after re-opening in January 2002. The shut-down occurred as a result of the cancellation of purchase agreements and loans by NAT's creditors. Subsequently, NAT applied for protection from its creditors and, on November 2, 2004, received approval for its Plan of Arrangement and Compromise from its creditors. The hearing of the application for the final Order approving the Plan by British Columbia's Supreme Court was be held on November 22, 2004. Results of that proceeding were not available at the time of writing this article. NAT anticipates that the mine will go back into production by mid-2005. The CanTung mine is located in the Deh Cho region of the Northwest Territories, approximately 360 km northwest of Fort Simpson but accessible only from Watson Lake, Yukon, by an all-weather road.

The value of gold and diamond shipments from the Northwest Territories over the period 1998-2003 is depicted in **Figure 34**. The graph shows the extent to which diamonds have superceded gold as the most important mineral produced in the Northwest Territories in recent years.

Con and Giant Gold Mines (Miramar Mining Corporation,100%)

The Con mine began operating in 1938 and has produced 5.5 million oz of gold to date. The Giant mine was brought into production in 1948 and has produced over 7 million oz of gold. The two mines ceased operations on November 28, 2003, and July 7, 2004, respectively, due to resource depletion.

Figure 34
Value of Gold and Diamond Shipments From the Northwest Territories, 1998-2003



Source: Northwest Territories Department of Resources, Wildlife and Economic Development.

Ekati Diamond Mine (BHP Billiton Diamonds Inc., 80%; C. Fipke, 10%; S. Blusson, 10%)

The Ekati mine is located 300 km northeast of Yellowknife. The Ekati mine claim blocks consist of 860 000 acres. Within that block, some 150 kimberlite pipes have been identified, 20 of which have been bulk sampled. Of the 20 pipes, 8 have been permitted and are in the current mine plan (**Figure 35**). The mine was constructed between January 1997 and October 1998. Production started on October 14, 1998.

PIPES PRODUCING DIAMONDS

The Koala open pit is now the main source of ore (**Table 21**). Operations in the Misery open pit were suspended at the end of 2003 but resumed production in July 2004.

PIPES IN THE PRE-PRODUCTION STAGE

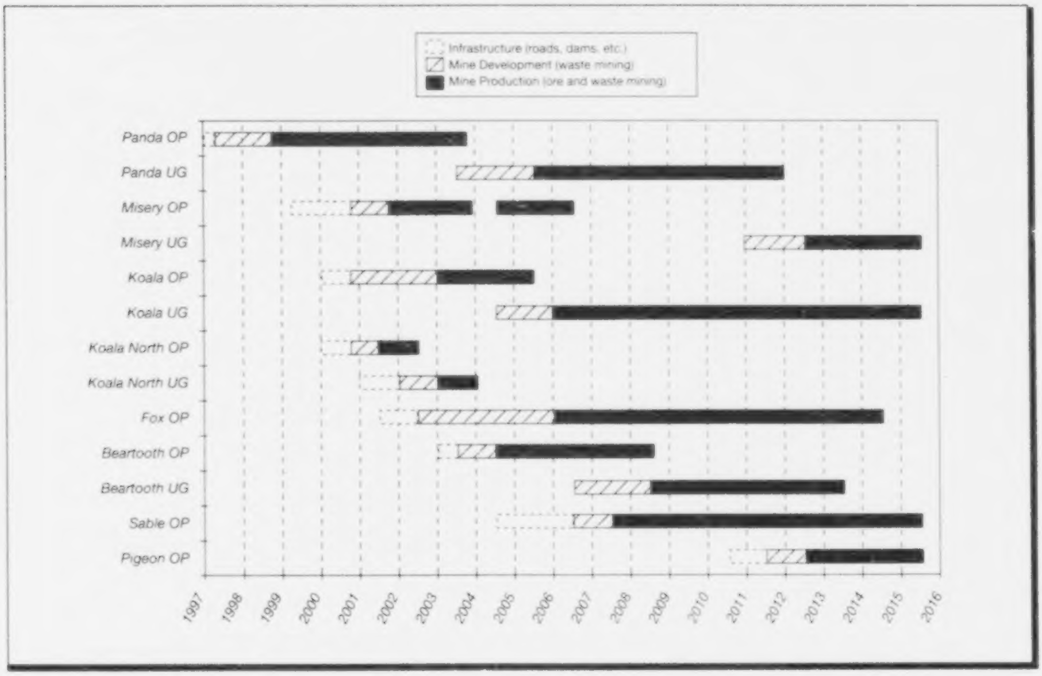
The Beartooth open pit and the Fox open pit are currently under development and are expected to produce diamonds by November 2004 and November 2005, respectively. In addition, the Panda underground project, at a cost of US$182 million, is under development. By the end of September 2004, the project was approximately 42% complete. It is expected to produce 4.7 million carats (Mct) of high-value diamonds over a six-year mine life at a capacity of 2600 t/d. Production is expected to begin in early 2005. The Koala underground project is in its pre-feasibility stage.

PIPES COMPLETED OR OPERATIONS THAT HAVE BEEN SUSPENDED

The Panda open pit has been completely mined out. Since Ekati is the first underground diamond mine in Canada, the Koala North pipe was used to test underground mining.

During 2003, Ekati produced 7.4 Mct of diamonds (**Table 22**). This amount accounts for more than 5% of 2003 global production by weight, or about 10% by value, attesting to the high quality of Ekati diamonds. In the first nine months of 2004, Ekati produced 3.2 Mct of diamonds, a decline of 17% compared to the same period in 2003.

Figure 35
Details of the Ekati Mine Plan, 1997-2016 (1997-2003 Based on Actuals)



Source: Northwest Territories Department of Resources, Wildlife and Economic Development, based on the December 2003 Ekati Mine Water Licence Renewal Application.

TABLE 21. REMAINING ORE RESERVES AND RESOURCES AT THE EKATI MINE, AS OF JUNE 30, 2004

Pipe	Total Reserves		Total Resources	
	(Mt)	(ct/t)	(Mt)	(ct/t)
Beartooth	1.2	0.8	2.5	1.1
Fox	16.5	0.4	26.7	0.4
Koala (OP)	3.2	0.7	4.9	0.7
Koala (UG)	4.7	1.3	10.9	1.1
Koala North (UG)	1.7	0.4	1.6	0.5
Misery	4.1	2.1	5.6	4.3
Panda (UG)	4.5	1.0	4.4	1.2
Pigeon	–	–	8.3	0.4
Sable	10.3	0.6	16.6	0.9
Total	46.2	0.78	81.5	0.95

Source: Northwest Territories Department of Resources, Wildlife and Economic Development, based on information from BHP Billiton Inc.'s 2004 annual report.
– Nil; OP Open pit; UG Underground.

TABLE 22. PRODUCTION STATISTICS FOR THE EKATI DIAMOND MINE, NORTHWEST TERRITORIES, 1998-2004

Year	Diamond Production	Value of Production	Total Production Cost
	(000 ct)	($ millions)	($ millions)
1998	203	41	. .
1999	2 429	606	397
2000	2 435	625	363
2001	3 716	718	443
2002	4 937	792	451
2003	7 368	1 304	419
2004 (a)	3 212	533	. .

Source: Northwest Territories Department of Resources, Wildlife and Economic Development, based on company information.

. . Not available.

(a) Data for 2004 include only the period January 2004 to September 2004 inclusive.

Notes: Values of production for 2003 and 2004 are estimates.

The kimberlite ore is currently being processed at an average rate of about 12 500 t/d, up from the original 9000 t/d, as indicated in the feasibility study. The company plans to ramp up the capacity gradually to 18 000 t/d by around 2007. The mine is slated to cease production from the eight pipes in 2015.

During 2003, the Ekati mine employed a total of 780 person-years. Of this, 77% were residents of the Northwest Territories and 38% were Aboriginals. For the same year, Northwest Territories' spending totaled $357 million, representing 85.3% of total expenditures.

Diavik Diamond Mine (Diavik Diamond Mines Inc., 60%; Aber Diamond Corporation, 40%)

The Diavik diamond mine is also located in the Lac de Gras area, about 300 km northeast of Yellowknife and 30 km southeast of the Ekati mine. In the Diavik Joint Venture's claim block, 63 kimberlites have been discovered, of which about half are diamondiferous. The Diavik mine includes four pipes: A154 South, A154 North, A418 and A21, with initial mineable reserves of 27.1 Mt of ore grading 3.9 carats per tonne (ct/t).

Permits and licences were obtained from the federal government in late 1999. Construction of the mine, at a cost of $1.25 billion, was completed in January 2003.

Diamond production commenced in January 2003. In the first year of operation, Diavik produced 3.8 Mct of diamonds and mined approximately 26 Mt of waste rock and 1.3 Mt of kimberlite ore. In the first nine months of 2004, Diavik produced just over 6 Mct of diamonds.

The initial mine plan called for 1.5 Mt of ore to be processed annually. In 2004, the processing plant operated comfortably above the initial planned capacity. Peak annual processing capacity of 2.0 Mt is expected to be achieved in 2005.

In 2004, diamonds were mined from both the A154 South pipe and the A154 North pipe, with the latter becoming the major source of diamond production by the last quarter of the year. Construction of the A418 dike is currently being planned and expected to begin in 2006. Underground mining of the A154 and A418 pipes is also under assessment. A production-scale decline will be developed in 2005 and 2006 to access the lower levels of the two pipes.

In 2003, Aber received US$96.22/ct for the first parcel of diamonds sold by the company. The average value for diamonds produced at Diavik in 2003 is estimated at US$78/ct. In 2004, the average value of diamonds from Diavik could be higher than initially estimated, as a bulk sample from A154 North was valued at US$82/ct, a dramatic increase from the previous estimate of US$36/ct for this pipe.

In 2003, the Diavik mine employed a total of 611 person-years. Of that work force, 73% were Northwest Territories' residents and 36% were Aboriginals. Expenditures that year totaled $202 million, with 80% of those expenditures occurring in the Northwest Territories.

2004 Exploration Summary

Exploration and deposit appraisals expenditures in the Northwest Territories are expected to total $110.7 million in 2004, more than double the spending of $53.6 million in 2003. The increase is essentially attributed to an increase of activity in the deposit appraisal work phase. Deposit appraisal spending is expected to increase by $51.6 million, from $20.7 million in 2003 to $72.3 million in 2004. Only a minor increase, of $5.5 million, is expected in the exploration work phase. (Deposit appraisal includes engineering studies, environmental studies and additional drilling to firm up on grade and tonnage estimates of known mineral deposits, while exploration involves the discovery of new mineral deposits.)

Exploration and deposit appraisal expenditures for Canada as a whole are expected to total $979.2 million in 2004. Expenditures in the Northwest Territories therefore account for around 11.3% of the Canadian total, up from last year's 7.8%.

The more advanced mineral exploration and development projects in the Northwest Territories are detailed in **Table 23**.

Work was carried out on 68 exploration projects in the Northwest Territories in 2003. Of this total, 52 projects were focused on diamonds and 16 on various metals (i.e., precious metals, base metals and steel industry metals). In 2004, it is expected that 26 mining companies will have conducted exploration activities in the Northwest Territories, with 19 of them focusing on diamonds and 7 on metals.

Diamonds

Diamond exploration highlights and developments for 2004 to date are outlined below.

De Beers Canada received a Class A Water Licence and a Land Use Permit from Indian and Northern Affairs Canada (INAC) on June 1, 2004, allowing it to proceed with the Snap Lake project. Since then, the project activities on-site have included: mine de-watering, re-commissioning the bulk sample plant, expanding camp facilities, and wildlife and environmental studies. Construction of the mine is anticipated to begin in 2005 and production is to commence in early 2007.

De Beers Canada elected to go ahead with a $25 million pre-feasibility study for the Gahcho Kué (Kennady Lake) project. The study commenced in January 2004 and is expected to be completed in mid-2005. The site work in 2004 focused on geotechnical aspects to firm up mine designs, as well as waste and water management. In 2004, geotechnical studies were conducted, including: 111 boreholes totaling 9440 m, engineering work, and the upgrading of camp facilities.

De Beers Canada identified five potential kimberlite targets at the Doyle Lake project as a result of detailed ground gravity surveys in the 2004 winter exploration program. The 2004 summer exploration program that started in mid-August 2004 has just been completed. Results are to be released.

TABLE 23. ADVANCED MINERAL EXPLORATION AND DEVELOPMENT PROJECTS IN THE NORTHWEST TERRITORIES, 2004

	Commodity	Owner	Tonnage (Mt)	Grade
Snap Lake	Diamonds	De Beers 100%	22.80 (Reserves)	1.46 ct/t diamonds
Gahcho Kué	Diamonds	De Beers 51% Mountain Province 44.1% Camphor 4.9%	14.04 (M&I Resources (a)) 31.00 (Total Resources)	1.64 ct/t diamonds
Damoti Lake	Gold	Doublestar Resources 100% (b)	0.46 (Resources)	15.97 g/t gold
Discovery/Nicholas Lake	Gold	Tyhee Development 100%	0.85 (Reserves) 2.67 (M&I Resources) 2.15 (Inferred Resources)	12.60 g/t gold 10.27 g/t gold
Courageous Lake	Gold	Seabridge Gold 100%	47.96 (M&I Resources)	2.06 g/t gold
NICO	Cobalt, gold, bismuth	Fortune Minerals 80% CANDOU 20%	28.19 (M&I Resources)	1.031 g/t gold 0.12% cobalt 0.14% bismuth
Prairie Creek	Zinc, lead, silver, copper	Canadian Zinc 100%	11.90 (Resources)	12.5% zinc 10.1% lead 161 g/t silver 0.4% copper
Howard's Pass	Zinc, lead	Placer Dome 100%	113.40 (Resources)	5.4% zinc 2.1% lead
Lake Zone, Thor Lake	Tantalum	Beta Minerals 100% (c)	65.00 (Resources)	0.03% Ta_2O 0.4% Nb_2O_5
"M" Zone, Hart Property	Zinc, lead silver, gold	Tri-Star Syndicate 51% Solid Resources 49%	1.20 (Resources)	5.10% zinc 2.2% lead 337 g/t silver 0.6 g/t gold

Source: Northwest Territories Department of Resources, Wildlife and Economic Development.
(a) M&I resources are measured and indicated resources excluding inferred resources. (b) Under a farm-in agreement, Anaconda has the right to earn a 55% interest by spending $2.5 million over a four-year period. (c) Navigator Exploration Corporation has an option to earn 51% of the Lake zone.

BHP Billiton approved (on May 4, 2004) the US$182 million Panda underground development project. It is estimated that this project will produce about 4.7 Mct of high-value diamonds over a six-year mine life. By the end of September 2004, the project was approximately 42% complete. In addition, BHP Billiton is expected to spend some $8 million for exploration and deposit appraisal in the Northwest Territories in 2004.

Diavik Diamond Mines Inc. increased its exploration expenditures to $9 million for calendar year 2004. Exploration has been targeted on both the A154 North pipe and the new reserves in the immediate mine area, as well as over the broader Diavik property. Emphasis has been placed on the evaluation of 27 kimberlite pipes located within a central core of the Diavik claim area supplemented by ongoing, wider exploration for new pipes. The 2004 winter program, including geophysical surveys and diamond drilling, identified two new kimberlite pipes, one 55 km northeast of the mine site and the other 4 km east of the A154 pit, to bring the total kimberlite pipes and bodies on the Diavik claim block to 64. A deep drilling program, completed in the third quarter of 2004, will help to better understand the orebodies and reserves of the two pipes.

In 2004, Diamondex Resources Ltd. carried out exploration encompassing the Lena West project in the Sahtu, and the Bear Head project, which adjoins the southern boundary of the Snap Lake and the Kelsey, Carat and Kingfish properties.

The Lena West project was budgeted at $3.5 million in 2004. Work completed in 2004 included airborne and ground geophysics (136 500 line-km of high-resolution, horizontal gradient airborne magnetic surveying), stream and till sampling (1100 samples), and auger drilling. Five diamonds were recovered with the largest diamond measuring 1.5 mm in its longest dimension. Results for Kimberlite Indicator Minerals (KIMs) are anticipated to be available in the first quarter of 2005. In addition, to follow up on this exploration program, Diamondex will conduct a diamond-drilling program to test the high-priority geophysical/geochemical targets.

At the Bear Head project, the recently completed 2004 summer exploration program, budgeted at $725 000, covered till sampling (379 samples), enzyme leach sampling (377 samples), geophysical surveying (5022 line-km of detailed airborne magnetic surveying), and auger drilling. Results of the samples should be available in the first quarter of 2005. Similar to Lena West, a drilling program would be conducted to test the targets.

Diamonds North Resources Ltd. released (on April 27, 2004) information on the recovery of two large diamonds from the eastern portion of the Sandpiper kimberlite (Blue Ice, Hadley Bay and White Ice projects) located on Victoria Island. The largest stone recovered measures 3.62 mm x 2.00 mm x 1.03 mm with a second stone measuring 2.34 mm x 1.00 mm x 0.81 mm. The summer exploration program, budgeted at $3 million, focused on drilling and geophysical surveying to collect larger samples from specific kimberlite bodies and prioritizing kimberlite targets. In addition, exploration, budgeted at $500 000, was also conducted at the Kidme-Misty project to evaluate airborne geophysical anomalies and identify drill targets.

SouthernEra Resources Ltd. discovered two new kimberlites, one in its Lac de Gras X Claims project and the other in its Yamba Lake project, as a result of its 2004 exploration program at a budget of over $1.4 million. Kimberlite samples have been sent to the Saskatchewan Research Council for testing. In addition, till samples were collected to better define existing kimberlitic indicator mineral trains where the sources have yet to be identified.

GGL Diamond Corp. reported promising results from the Doyle sill and the Seahorse kimberlite. According to GGL Diamond Corp., the results of the two drill core samples from the Doyle sill show the kimberlite's "high diamond-bearing potential." Similar results were also obtained from the company's Rainier and Shasta kimberlites of the Seahorse kimberlites project. In addition, an airborne geophysics survey evaluated 33 new targets on the Seahorse and Courageous claims. Prioritization of these targets will help focus drilling activities in the 2005 winter drill season.

Arctic Star Diamond Corp. completed the 2004 summer drilling program on the Credit Lake project. The 434 samples collected have been sent for analysis and results were expected to be available in the last week of November 2004. Based on an agreement with Kennecott Exploration Inc., Arctic Star has now earned into the Credit Lake project, as it has spent over US$1 million on the property, surpassing the required US$900 000 specified in their agreement. Kennecott, however, retains an 80% back-in right on the Credit Lake project, which can be triggered at any time up to a decision to mine. The airborne geophysics survey will help to identify targets for the 2005 winter drill season.

Metals

Exploration highlights and developments for 2004 to date are described below.

Tyhee Development Corp. completed a surface drilling program on the Ormbsy zone, resulting in the intersection of two significant zones of gold mineralization in the Ormsby zone decline. Final assays are pending. The surface drill program, completed in September 2004, encompassed 26 holes for a total of 9946 m of core. Excavation of the Ormsby zone decline has been completed to a depth of 287 m. The planned depth is 600 m. As of September 2004, the rate of advancement has improved steadily to 120 m per month. In addition, assay results from underground sampling at the Discovery mine confirmed the predicted resource block model. In early 2004, gold resources in the Ormsby zone and Nicholas Lake main zones had already been increased to measured and indicated resources of 2.67 Mt grading 10.27 g/t gold (0.88 million oz) and inferred resources of 2.15 Mt at 10.07 g/t gold (0.70 million oz).

Seabridge Gold Inc. initiated a 10 000-m core drill program in June 2004, focusing on testing the Salmita and Tundra zones as well as the South Strike extension of the FAT deposit. Positive assay results from 17 of 19 new diamond drillholes completed in late 2004 have added 300 m to the strike length to the FAT deposit. A strong potential for resource expansion is envisaged.

Canadian Zinc Corp. has carried out a $3 million summer exploration program (including $1 million spent on surface exploration) in 2004. The first 15 holes of a 27-hole program have so far intersected high-grade lead (14.8%), zinc (23.4%) and silver (740 g/t) within and outside the known resource. In addition, Canadian Zinc opened its Prairie Creek mine camp in May 2004. Mobilization of supplies and support services and maintenance of equipment was initiated in late 2004. An underground development program is also under planning and preparation. Canadian Zinc's application for a Land Use Permit for the existing winter road that runs from the Liard highway in to the mine has completed preliminary screening by the Mackenzie Valley Land and Water Board and has now been referred for environmental assessment to the Mackenzie Valley Environmental Impact Review Board. The company also plans to file its application for the land-use permits and water licence for commercial operation of the Prairie Creek mine in late 2004.

In 2004, Fortune Minerals Limited focused its work on the completion of the bankable feasibility study (by Micon International), at a budget of $1.6 million, of the NICO cobalt-gold-bismuth project, 160 km northwest of Yellowknife. Expected total expenditures in 2004 on the NICO project could reach $2.5 million, including drilling, environmental permitting, and feasibility study costs. The company intends to develop NICO in the following two years. To date, some $11 million has been expended on the project.

2004 Government Programs (Northwest Territories Geoscience Office)[22]

The Northwest Territories Geoscience Office (NTGO), formerly known as the C.S. Lord Northern Geoscience Centre, is a partnership between Indian and Northern Affairs Canada (INAC), the Northwest Territories' Geology Division of the Department of Resources, Wildlife and Economic Development, and the Geological Survey of Canada (GSC). The office is funded and staffed by all three agencies and managed internally with input from the three departments. The following paragraphs provide an overview of NTGO's geoscience programs, which aim to contribute to the following outcomes: a prosperous, sustainable resource-based economy in the Northwest Territories; a significant contribution by the Northwest Territories to Canada's energy supply; and the informed use of geoscience information to underpin land use, land claims and resource management policies and decisions.

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[22] For more information on the Northwest Territories Geoscience Office, the reader is invited to contact Carolyn Relf by telephone at (867) 669-2635 or by e-mail at carolyn_relf@gov.nt.ca.

Field-Based Projects

Five field-based projects are currently under way at NTGO. These projects are described below.

WOPMAY OROGEN BEDROCK MAPPING AND INTEGRATED STUDIES (YEAR 1 OF 4)

The Wopmay project is a multi-year bedrock mapping project (2004-07) covering a transect from the Great Bear magmatic zone in the west, across the Wopmay fault zone through the Wopmay hinterland to the underlying Slave craton in the east. The project will upgrade existing (circa. 1940s) mapping and assess mineral occurrences across the region in the context of their stratigraphic and structural settings. Supported studies include a graduate student's thesis (University of British Columbia) on the petrogenesis of the magmatic arc and a post-doctorate project involving LA-ICP-MS (Laser Ablation-Inductively Coupled Plasma-Mass Spectroscopy) dating of units east of the fault zone (Memorial University) to distinguish Archean (Slave) basement rocks from Paleoproterozoic cover. An interim geologic map will be released in spring 2005.

IMAGING OF LOWER CRUST/UPPER MANTLE ACROSS THE WESTERN SLAVE/EASTERN WOPMAY (YEAR 2 OF 4)

Two teleseismic instruments were deployed in 2004 in the Wopmay hinterland and Great Bear Magmatic zone. Coupled with two stations installed in 2003 in the western Slave Province, they define a transect over 150 km in length. During June and July, a series of magnetotelluric measurements were made along the same transect. It is expected that these instruments will collectively provide insights into the nature and orientation of east-dipping mantle reflectors imaged by Lithoprobe's SNORCLE transect farther to the south. Real-time data from POLARIS instruments can be viewed at www.polarisnet.ca.

SNOWBIRD LAKE BEDROCK MAPPING AND INTEGRATED STUDIES (YEAR 1 OF 1)

The Snowbird study is a one-year mapping project that will upgrade selected areas of NTS map sheet 65D in order to characterize the nature of the crust in the three tectonic domains exposed in the area (Hearn, Rae and Selwyn lozenge domains). In spring 2004, the existing bedrock geology map (Taylor, 1963) was re-interpreted using the newly acquired aeromagnetic data. This updated map was used to focus mapping in areas with poor correspondence between bedrock geology and magnetic signature. The project also included surficial mapping and drift prospecting components. Ninety-one esker samples were collected and are being processed for KIMs and bulk geochemistry, and 61 till samples were collected down-ice from three ultramafic-hosted nickel occurrences to assess the value of till geochemistry as an exploration tool for nickel-copper-PGE deposits in this terrane. A surficial geology map, based on airphoto interpretation coupled with ground truthing, will provide a framework within which to interpret the till data. Digital bedrock and surficial geology maps will be released by spring 2005. Point datasets will be released over winter/spring 2005.

WECHO RIVER BEDROCK MAPPING AND INTEGRATED STUDIES (YEAR 2 OF 2)

Mapping was completed in the Wecho River area in the southwestern Slave Province in 2004. The project, designed to upgrade existing maps for the area between Snare River to the west (Jackson, in preparation) and the Yellowknife Basin to the east, delineated a number of previously undocumented domains underlain by supracrustal rocks and subdivided granitoid rocks in the area. A graduate student's study on the petrogenesis of granitoid rocks in the area is being supported by this project (Carleton University). The final digital bedrock map and database will be released by spring 2005.

SELWYN BASIN PROJECT

As a first step in a multi-year project to upgrade the regional bedrock geology of the Selwyn Basin (including stratigraphic and structural histories and regional metallogeny), the compilation of existing geologic data for the basin and environs is under way. Among the most significant knowledge gaps in the Selwyn Basin are a lack of publicly available regional aeromagnetic and geochemical data for much of the area. In collaboration with the GSC, the collection of new geochemical data was initiated in the summer of 2004 (primarily through a stream sediment survey of sheet105P) and a combined radiometric/aeromagnetic survey is planned for the Sekwi Ranges in summer 2005.

Data Mining Projects

Eight compilation ("data mining") projects were undertaken in fiscal year 2003/04.

SLAVE CRATON: INTERPRETIVE BEDROCK COMPILATION (YEAR 2 OF 2)

A digital bedrock compilation of the Slave Craton based on publicly available and proprietary geology maps, satellite data and aeromagnetic data is being undertaken by Stubley Geoscience. A preliminary map covering roughly two thirds of the craton was released in April 2004; the final map and database are nearly complete and will be technically reviewed over the winter. The project is funded jointly by NTGO and INAC in Nunavut. The final map and database will be released by spring 2005.

NORMIN MINERAL SHOWINGS (ONGOING)

Research and entry of data on the Northwest Territories' mineral showings are ongoing. The work is concentrated on updating knowledge on significant mineral deposits and active exploration properties.

MINE-MATCH (YEAR 1 OF 1)

Mine-Match is a software package that correlates mineral occurrence attributes with mineral deposits worldwide. A contract is under way to link mineral showings in NORMIN to deposit characteristics. Mine-Match, which is proprietary software, will include Northwest Territories' mineral showings data by March 2005.

DIAMOND DATABASE UPDATES (ONGOING)

The Kimberlite Indicator and Diamond Database (KIDD) and Kimberlite Indicator Mineral Chemistry (KIMC) databases were updated in spring 2004. KIDD and KIMC were released in early summer 2004.

FORMATION TOPS (YEAR 2 OF 2)

A project is under way to compile and correlate subsurface formation tops based on oil and gas exploration well reports and geophysical logs filed with the National Energy Board. Core and cuttings are also being examined. The study will update the National Energy Board's Schedule of Wells and unify the formation names based on modern nomenclature. This project is partially supported by Natural Resources Canada's Targeted Geoscience Initiative II. A spreadsheet of picks will be released by spring 2005.

MACKENZIE CORRIDOR ATLAS (YEAR 2 OF 4)

An overview of the petroleum geology of Phanerozoic sub-basins in the Mackenzie Valley is being compiled in a geologic atlas by the GSC's Calgary office and partners. NTGO is contributing to a regional overview chapter. Chapter 1 (Resources and Infrastructure) of the Mackenzie Corridor Atlas will be released by spring 2005.

GEOCHEMICAL DATA COMPILATION (YEAR 1 OF 1)

Bulk till geochemistry from scanned assessment reports is being converted to digital spatial point data to generate a Geographic Information Systems (GIS) database of till sample locations, assay results and sample metadata. A spatial database will be released by spring 2005.

RE-ANALYSIS OF ARCHIVED LAKE SEDIMENT SAMPLES (YEAR 1 OF 1)

Limited funds were acquired to re-analyze samples of lake sediment samples collected by the GSC from the central Slave Province (early 1970s) and western Churchill Province (mid-1980s). Negotiations are under way with the GSC to access archived powders for analysis. If successful, a spatial database will be released by spring 2005.

Outreach/Education

Activities associated with geoscience outreach and education continued to increase in 2004-05, driven largely by demand from Northwest Territories' communities. The community mapping program and the University of Alberta field school were both delivered in 2004.

GAMETI COMMUNITY MAPPING PROJECT

A community-based mapping project was carried out in Gameti in 2004. This project engaged three local beneficiaries in mapping bedrock and surficial geology near the community, as well as local points of cultural and geographic interest. In addition, two presentations were made to the Gameti band council to inform them of the Wopmay mapping project and Slave/Wopmay geophysical transect; permission was requested and granted to locate one of the teleseismic stations near the community. Installation of the instrument was part of the community mapping project. A poster summarizing the project highlights was prepared by NTGO with input from local participants. The poster will be presented to the community in January 2005.

UNIVERSITY OF ALBERTA FIELD SCHOOL

A two-week field school was held for senior undergraduate students at the University of Alberta's Department of Earth and Atmospheric Sciences in late August/early September. The for-credit course focused primarily on bedrock mapping in the Lac du Sauvage area, central Slave Province. A digital bedrock map will be released by spring 2005.

Other outreach activities included the following: visits to communities in the southern Northwest Territories and Mackenzie Valley to discuss petroleum geology and exploration activities; visits to Aurora College to present information to the Natural Resources class; a Geoscape poster highlighting Northwest Territories geology; outreach products generated from NTGO geoscience projects (e.g., a tourist brochure describing the geology along the Emile River, based on a recently completed mapping project); school visits, geology tours, and requests for community map and oil and gas posters; and provision of rock samples to various institutions.

University Grants

Three grants in support of university-based research were made in 2004-05.

AGE DATING OF GOLD MINERALIZATION AT CON AND GIANT DEPOSITS

A grant was made to the University of Alberta to date arsenopyrite in ore samples from the Con and Giant gold deposits in order to establish the absolute age of mineralization in the Yellowknife gold camp.

GEOCHRONOLOGIC STUDY OF ROCKS FROM SOUTHEASTERN WOPMAY OROGEN

An LA-ICP-MS study of rocks from the eastern part of the Wopmay orogen is being undertaken at Memorial University. The research is part of a post-doctoral study and is a contribution to the Wopmay bedrock mapping project.

PETROLOGY AND METALLOGENY OF THE GREAT BEAR MAGMATIC ZONE

A grant was provided to the University of British Columbia for a study of the petrogenesis of plutonic and volcanic arc rocks of the Great Bear magmatic zone. The study is a contribution to the Wopmay bedrock mapping project.

Non-Renewable Resource Assessments Funding

Non-Renewable Resource Assessments (NRAs), carried out in support of the Northwest Territories Protected Areas Strategy (PAS) and land-use planning, are under way in a number of areas of the Northwest Territories.

TRAVAILLANT LAKE (YEAR 2 OF 3)

The Travaillant Lake area has been proposed as a conservation zone under the draft Gwich'in Land Use Plan. In 2004, till samples were collected from the area with GSC colleagues. These are being analyzed for bulk chemistry and heavy minerals to aid in assessing the area's mineral potential. Results of the survey will be released by spring/summer 2005.

MACKENZIE VALLEY ACTION PLAN (YEAR 1 OF 5)

Funding was acquired to provide non-renewable resource assessments in support of the Northwest Territories Protected Areas Strategy five-year Mackenzie Valley Action Plan. Under the plan, regional mineral and hydrocarbon potential maps are being developed for the Sahtu and Gwich'in settlement areas. Work is ongoing.

Client Services

The most significant new client service this fiscal year has been the launch of the Gateway Reference Browser at www.nwtgeoscience.ca, following completion of Assessment Report (AR) scanning. The Gateway is linked to the NORMIN reference database and allows users to browse, download or order ARs and NTGO publications. Tracking of downloads and orders allows NTGO to monitor which types of reports are most useful to clients; this information aids in future program planning.

In 2004, NTGO released a number of open file reports. These reports can be obtained from the NTGO at www.nwtgeoscience.ca.

2.13 NUNAVUT[23]

Land Tenure in Nunavut

In 1993, the largest Aboriginal land settlement in Canadian history was concluded through the Nunavut Land Claims Agreement (NLCA). The NLCA provided for the formation of the new territory of Nunavut on April 1, 1999, and provided many other rights to Inuit. Nunavut, which covers 1 994 000 km^2, comprises the eastern and northern portions of land previously referred to as the Keewatin and Franklin districts of the Northwest Territories.

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[23] This overview is a combined effort of four partners: the Minerals and Petroleum Resources Division of the Government of Nunavut, the Mineral Resources Section of Indian and Northern Affairs Canada, the Lands and Resources Department of Nunavut Tunngavik Inc., and the Canada-Nunavut Geoscience Office. For more information, please contact David Smith by telephone at (867) 975-5914 or by e-mail at dsmith@gov.nu.ca.

Nunavut's population approximates 27 000, 85% of which is of Inuit origin. A total of 27 communities are home to anywhere from 50 to 6000 people. Several communities offer a range of services useful to the mineral exploration and mining industry, including regular scheduled air service. More information on these services can be obtained by visiting the Canada-Nunavut Community Business Service Centre web site at www.cbsc.org/nunavut. Some of these communities are also home to independent prospectors and others experienced in mineral exploration and mining.

In addition to the creation of the new territory, the NLCA gave Inuit fee simple title to 356 000 km^2 of land. There are 944 parcels (16% of Nunavut) of Inuit Owned Lands (IOL) where Inuit hold surface title only (Surface IOL). The Crown retains the mineral rights to these lands. Inuit also hold fee simple title, including mineral rights, to the remaining 150 parcels of IOL (Subsurface IOL), which total 38 000 km^2 and represent approximately 2% of the territory.

Surface title to all IOL is held in each region by one of the three Regional Inuit Associations (RIAs) while Inuit subsurface title with respect to Subsurface IOL is held and administered by Nunavut Tunngavik Incorporated (NTI). NTI issues rights to explore and mine through its own mineral tenure regime. Mineral rights (mineral claims or leases) that existed at the time of the signing of the NLCA, known as "grandfathered rights," will continue to be administered by Indian and Northern Affairs Canada (INAC) until they terminate or until the holder transfers its interests to the NTI regime. For both Surface and Subsurface IOL, access to the land, through a Land Use Licence or Commercial Lease, must be obtained from the appropriate RIA.

The Crown owns mineral rights to 98% of Nunavut. INAC administers these rights through the Canada Mining Regulations (CMR). This includes Surface IOL, for which access to the land must nevertheless be obtained from the RIA as explained above.

Significantly, the NLCA is a final settlement whereby all land claims in Nunavut have been settled with the Inuit of Nunavut, thus providing an unmatched level of land tenure certainty. However, land claims overlapping Hudson Bay and the southernmost Kivalliq are being negotiated with residents of northern Québec and northern Manitoba, respectively.

Government of Nunavut

The Government of Nunavut's Department of Economic Development and Transportation (ED&T) deals with issues related to Nunavut's minerals industry. ED&T is committed to establishing a sustainable and vibrant minerals industry across the territory that in turn will contribute to the sustenance of healthy communities throughout Nunavut.

ED&T focuses on community education and awareness, supports prospector development, and is committed to improving the geoscience database and upgrading transportation and human infrastructure. ED&T is also committed to resource management, modernization of land-use legislation, and development of an exemplary mineral industry policy. ED&T functions as a liaison between industry and communities, local service sectors, educational institutions, work forces, and prospectors. These efforts will lead to improved investor confidence, which is already very strong.

ED&T maintains offices in Iqaluit, Arviat and Kugluktuk, the latter two being staffed by a Resident Geologist and a Community Mining Advisor. Headquarters are located in Iqaluit.

Education, Training and Support Programs

PROSPECTOR DEVELOPMENT - NUNAVUT'S PROSPECTORS PROGRAM (NPP)

Initiated in 1999, the NPP provides financial and technical assistance to Nunavut prospectors. Several prospectors have made significant mineral discoveries over the past four years, culminating recently in three prospectors signing an option agreement for a property in the Baffin region. In 2004, 24 prospectors from across Nunavut received funding of up to $5000 through the program. A total of 12 NPP-supported prospectors hold mineral claims in Nunavut with interesting gold, platinum, base-metal and gemstone (sapphire and diamond) prospects. As mentioned above, three prospectors have recently completed an option agreement with Vancouver-based True North Gems. ED&T initiated this very successful program to help prospectors evaluate and collect rock samples in order to stake claims and actively contribute to mineral exploration in Nunavut. Eleven prospectors are from the Kivalliq region, 7 are from the Kitikmeot region, and 6 are from the Baffin region. Including NPP-supported projects, 15 prospectors hold claims in Nunavut, and these include some significant gold, platinum, base-metal, gemstone and kimberlite prospects.

INTRODUCTORY PROSPECTING COURSE

A six-day Introductory Prospecting Course is delivered in communities throughout Nunavut every year. Since 2000, the courses have been offered in all communities in the territory, with over 350 graduates to date. Popular with prospectors and individuals with a general interest in mineral exploration and mining, the course is an introduction to rock and mineral identification, map reading, sample collection and claim staking. The course is a stepping stone for people who want to pursue prospecting as a career and/or hobby, building on the Inuit traditional knowledge of the land. Many people who take the course subsequently find employment with exploration companies active in their areas.

Indian and Northern Affairs Canada: Nunavut Regional Office

Indian and Northern Affairs Canada (INAC) administers mineral tenure on Crown land in Nunavut. The Nunavut Regional Office in Iqaluit has two sections involved in regulating tenure, the Mineral Resources Section and the Mining Recorder's Office (a part of Land Administration). The Mineral Resources Section staff are involved in mineral tenure through the review of assessment reports filed under the CMR and through property visits to mines and exploration projects. This section's staff are also involved in selected research projects and outreach activities in Nunavut.

The year 2004 was another busy year as an unprecedented number of applications for prospecting permits was received; this resulted in proponents holding the largest area of Crown land in the history of Nunavut. A total of 1522 prospecting permits encompassing 25.9 million hectares (Mha) were granted by the Mining Recorder's Office. The bulk of the issued permits are in a corridor from the northern Manitoba border northeastward to the northern end of Baffin Island, including most of the Melville and Boothia peninsulas. This brings the total area of Nunavut covered by permits to 33.4 Mha, and to 43.1 Mha when claims are included.

The main commodity being sought is diamonds, although exploration for precious and base metals is still strong in Nunavut, due in part to the increase in market prices. Diamond exploration was conducted across the territory with significant new discoveries on the Boothia, Melville and Brodeur peninsulas, as well as in the Rankin Inlet area. Other commodities such as iron and gemstones are also being sought.

Nunavut Tunngavik Incorporated

Nunavut Tunngavik Incorporated (NTI) is the Inuit corporation responsible for overseeing implementation of the NLCA. NTI's mandate includes safeguarding, administering and advancing the rights and benefits of the Inuit of Nunavut to promote their economic, social and cultural well-being through succeeding generations. The Lands and Resources Department of NTI is responsible for the implementation of Inuit responsibilities related to the management of Inuit Owned Lands (IOL), the environment, minerals, oil and gas, and marine areas.

There are two forms of mineral tenure that grant exclusive rights on Subsurface IOL administered by NTI. These are the Inuit Owned Lands Mineral Exploration Agreement (usually referred to as the "Exploration Agreement," or "EA") and the Inuit Owned Lands Mineral Production Lease (referred to as the "Production Lease"). The Exploration Agreement grants a company or individual the exclusive right to explore and prospect for minerals (excluding oil and gas, and specified substances such as construction materials and carving stone) on a portion of Subsurface IOL. This area, referred to as the Exploration Area, is similar in many ways to a mineral claim under the CMR.

The Production Lease grants the holder of an Exploration Agreement the right to produce minerals from a portion of the Exploration Area known as the Production Lease Area. In 2004, Miramar Mining Corporation submitted an application for the first NTI Production Lease for the Doris gold deposit.

Since 1999, NTI has had in place a system of application that does not require staking when applying for an Exploration Agreement. Rather, the application requires only a description of the Exploration Area based on latitude and longitude. The applicant must submit to NTI a completed application form (Application for an Inuit Owned Lands Mineral Exploration Agreement, available on request from NTI or from the Nunavut Lands Department web site). The completed application includes a description of the proposed Exploration Area defined by the latitude and longitude of the boundaries and by a map showing the proposed Exploration Area. Applications are received during designated months and are processed at the start of the subsequent month, at which time NTI will decide whether to accept an application and issue an Exploration Agreement. Applications are kept confidential until the close of the application period in which they are received, thus ensuring that all applicants are treated fairly. Further details on the application process are included in the application form.

It should be noted that although the process and documents described here normally apply, NTI, as a private organization, has complete discretion as to whether it will issue an Exploration Agreement (or other agreement), what the process will be for obtaining an agreement, and what the terms of the agreement will be. The terms may include, for example, NTI holding a direct interest in a project.

Under the standard terms, successful applicants, upon executing the new Exploration Agreement and submitting the first year's annual fees, will be granted the exclusive right to explore for minerals on the Exploration Area. In order to gain access to the land, however, the applicant must obtain a surface right issued by the RIA.

NTI currently has 60 active Exploration Agreements with prospectors and exploration and mining companies. These cover more than 16% of the total Subsurface IOL. (In addition, "grandfathered" claims and leases comprise approximately 2% of all subsurface IOL.)

The significant decrease in the percentage of IOL under Exploration Agreements (down from 25% in the previous year) is due to a reduction in the area of the Exploration Agreement with Strongbow Exploration Inc. in the West Kitikmeot region.

Holders of Exploration Agreements are required to submit annual exploration work reports to NTI. These reports remain confidential for a period of up to three years.

Canada-Nunavut Geoscience Office

The Canada-Nunavut Geoscience Office (C-NGO) is a partnership between the Government of Nunavut, the Geological Survey of Canada (GSC), and Indian and Northern Affairs Canada (INAC). During 2004, the C-NGO engaged in one major bedrock mapping project (Boothia Mainland) and a thematic project on northern Baffin Island (Borden Basin). Reports on these projects will be published in forthcoming issues of the GSC's Current Research and as GSC Open Files. The North Baffin Quaternary project was put on hold in 2004 but will resume in 2005.

In collaboration with INAC and the GSC, the C-NGO initiated the Boothia Mainland project. The study area, located south of the community of Taloyoak, was critically selected to bridge the gap between the Committee Bay supracrustal belt to the south and the poorly documented Barclay supracrustal belt to the north. In addition to bedrock mapping, a collaborative effort between the GSC and INAC obtained a new regional aeromagnetic dataset for regions lying north of 68°N on the Boothia Peninsula in 2004. More than 100 000 line-km were flown at a line spacing of 400 m and an elevation of 150 m. The new data, the first publicly available for the region, will facilitate the next phase of bedrock mapping of the Archean Barclay supracrustal belt from 68°N to approximately 69.5°N. In 2005, bedrock mapping will be led by the GSC in collaboration with the C-NGO and university partners.

During the winter of 2004-05, the Boothia Mainland project will contribute to framework mapping and geoscience knowledge in Nunavut including: 1) three new 1:100 000-scale geologic maps; 2) digital compilation of all available geophysical and remotely sensed datasets; 3) digital release of all subsidiary datasets, including those derived from surficial, structural, petrological and geochronological studies; and 4) progress reports or presentations to be given at appropriate geoscience meetings. These outputs will directly address the immediate need to improve the geoscience knowledge base in Nunavut. These data will help to assist and promote mineral exploration and will appropriately enhance future land-use planning and mineral activities in the region.

Ongoing field research into the structure, stratigraphy and metallogeny of the Borden Basin, the district associated with the Nanisivik orebody, focused on stratigraphic and structural constraints on zinc-lead mineralization in the Milne Inlet Graben (Borden Basin thematic research project). Published products include five Current Research papers (2004-B2, B3, B4; 2003-B2, B3). This project is in mid-stream with respect to field data collection. Field and analytical work is provisionally planned to continue in 2005 and 2006.

The Arctic Zinc project, a collaborative project with GSC-Calgary focusing on the controls of zinc-lead mineralization in the Cornwallis District, which hosts the Polaris orebody, is entering the completion phase. Open File map 1780, a 1:50 000-scale map of Little Cornwallis Island and part of northern Cornwallis Island, was published in 2004 and includes details of the regional structures at the Polaris orebody and the Eclipse and Rookery Creek showings. The project is expected to wrap up in 2006 with a GSC Bulletin that will synthesize the structure and metallogeny of the district.

In 2003, the C-NGO initiated the North Baffin project, a three-year study of the Quaternary geology of NTS map sheets 37E, 37F, 37G and 37H. The glacial history of the region is poorly understood; an improved surficial geoscience knowledge base is a necessary prerequisite to effective mineral exploration. The study area has potential for gold, nickel, zinc and PGE mineralization, as well as potential for kimberlite occurrences. The field component of the project was put on hold in 2004 for staffing reasons. Field work will resume in 2005 and involve continuation of mapping initiated in 2003. The North Baffin project's drift-prospecting survey, surficial materials mapping and ice-movement chronology have potential to identify new mineral resources, reduce exploration risk, and elucidate glacial history.

The North Baffin project will make use of collaborations with university-based researchers to improve the understanding of ice dynamics to better interpret ice transport, and thus till geochemistry results. A project with the University of Alberta will examine sea level changes since deglaciation to better understand ice loading and variations in ice thickness temporally and spatially. In cooperation with Dalhousie University, the C-NGO will generate an ice-sheet model to better extrapolate the findings in the study area to a more regional perspective.

A GSC Current Research report based on North Baffin field work (2004-B1) discusses the ice dynamics in NTS area 37G; the interpretations presented will be tested in 2005. Results of the 2003 sampling programs (bedrock and till geochemistry, including till gold-grain counts) will be published in early 2005 as GSC Open File reports. The surficial geology maps will be released as GSC Open File maps. Reports on the technical aspects of the project in 2005 will be published in GSC's Current Research.

Summary of Exploration Activities - 2004

Kivalliq Region

The Kivalliq region includes the eastern mainland, Southampton Island and several smaller islands. The largest communities (Rankin Inlet, Arviat and Baker Lake) are the primary staging points for exploration projects inland and offer expediting services.

The Kivalliq region is underlain primarily by the Archean-Proterozoic Western Churchill geological province. Sedimentary rocks of the Hudson Platform are found covering most of the islands.

Past-producing mines in the region include the North Rankin nickel mine at Rankin Inlet and the Cullaton Lake/Shear Lake operation north of Nueltin Lake. Past exploration has focussed on lode and iron formation-hosted gold, volcanogenic massive sulphide (VMS) unconformity-hosted gold, and mafic-ultramafic nickel-copper plus PGE deposits. The presence of other styles of mineralization, such as epithermal gold, diamondiferous lamprophyres and kimberlite float, has also been demonstrated.

NANUQ PROJECT

The Nanuq property (Peregrine Diamonds Ltd. and BHP Billiton Diamonds Inc.) is underlain predominantly by undifferentiated granitic and gneissic rocks of Archean age and minor granulite-facies, likely of Paleoproterozoic age. The near-vertical Wager Bay shear zone cuts the northern part of the property in an east-west direction.

In 2003, Dunsmuir Ventures Ltd. flew a 12 000 line-km HRAM survey at a 150-m line-spacing and collected 472 till samples to complement previously acquired till sample results. Kimberlite indicator minerals (KIMs) recovered from the property include G9 and G10 pyrope garnets, diamond inclusion field eclogitic garnets, diamond inclusion field and kimberlitic chromites, chrome diopside and olivine. Dunsmuir also acquired the Nanuq South property encompassing 253 300 ha, bringing its total land package to approximately 593 000 ha.

A Falcon^{TM} airborne gravity gradiometer and magnetic survey was completed this year over a portion of the Nanuq property. The survey, covering approximately 7500 line-km, was designed to target the likely kimberlite source areas to the main Nanuq and Southwestern KIM trains. A summer field program that involved the collection of an additional 501 till samples, mainly from the areas at the heads of these two main trains, was also completed. The gravity survey in conjunction with five previous field seasons of till sampling will be used to identify new targets for diamond drilling in 2005.

FERGUSON LAKE PROJECT

Starfield Resources Ltd. acquired the Ferguson Lake property in 1999. It then conducted geophysical surveys and drilled 62 000 m in 162 holes between 1999 and 2002. In July 2003, Starfield entered into a joint-venture agreement with Wyn Developments Inc. and, in February 2004, the partners doubled their land position, which now covers more than 10 100 ha (in addition to the 14 450 ha wholly owned by Starfield).

The Ferguson Lake deposit is a nickel-copper-PGE deposit hosted by moderate to weakly foliated tholeiitic gabbro-hornblendite layered intrusions. The deposits are considered to be of magmatic origin, having formed as immiscible sulphide segregations during emplacement. The sills were emplaced along an east-west trending structure interpreted by Starfield personnel as a regional suture based on three-dimensional magnetic inversion. Gabbro hosting the copper-nickel-PGE mineralization is exposed 1.8 km along strike on the West zone and may extend another 16.6 km to the west.

A UTEM survey, conducted in 2003, extended the 119 Extension conductor, prompting the company to acquire additional ground. Encouraging drill results from fall 2003 drilling were also released in early 2004 and include a 20.95-m massive sulphide interval grading 1.53% copper, 0.97% nickel, 0.09% cobalt, 2.45 g/t palladium and 0.24 g/t platinum, and a low-sulphide zone grading 17.01 g/t platinum and 10.82 palladium over 0.95 m.

In 2004, Starfield conducted a heli-borne VTEM survey that outlined continuous electromagnetic (EM) conductors totaling 15 km. Drill results include several intervals of approximately 1 m of high-grade platinum-palladium as well as massive sulphide intersections of up to 2% combined copper and nickel over 17.2 m, including 4.8 g/t platinum plus palladium over 6.37 m. Two separate high-PGE, low-sulphide lenses were discovered above the massive sulphide horizon. Since low-sulphide mineralization generally occurs in the footwall to the massive sulphides, this occurrence is unique and may be significant.

MEADOWBANK PROJECT

The Meadowbank (Cumberland Resources Ltd.) gold deposits occur within the Archean Woodburn Lake greenstone belt, about 75 km north of Baker Lake, and represent the third largest undeveloped gold resource in Canada with approximately 3.2 million oz of measured and indicated resources and 0.6 million oz of inferred resources. The stratigraphy consists of quartzite overlying komatiite, which in turn overlies intercalated felsic to intermediate volcanic rocks and iron formations. Regionally, four phases of deformation are recognized. The stratigraphy is folded into a northwest-trending, isoclinal, recumbent anticline flanked by two large granitoid intrusions.

Mineralization is hosted by interbedded iron formation and felsic to intermediate tuff, with subordinate orthoquartzite and ultramafic schist. Sulphides (pyrrhotite and pyrite) and gold occur within a structural fabric associated with early progressive isoclinal folding. Alteration includes sericitization, sulphidation, silicification and carbonatization.

Six near-surface gold deposits have been identified: Goose Island, Third Portage, North Portage, Vault, Bay Zone and PDF. The Connector zone links the Third and North Portage deposits.

In March 2004, Cumberland announced a delay in the completion of its feasibility study due to higher-than-expected pre-production capital cost estimates, largely related to price increases in construction consumables such as steel, concrete and fuel. A review of the preliminary estimate of capital costs and an assessment of the potential for capital cost reduction are under way. The delay will allow the company to examine various possible mine designs and to determine the most economically viable plan for production at Meadowbank.

The 2004 program focused on expanding existing gold deposits and exploring the potential of recently defined prospects, as well as grassroots exploration across the 25-km gold trend. This has included diamond drilling totalling 14 700 m in 90 holes, with the majority targeting the Goose Island and Vault deposits. The intention of delineation drilling at Vault and Goose Island was also to expand open-pit design through conversion of inferred resources to the measured and indicated category. In-fill drilling of the Goose Island deposit yielded some high-grade intercepts such as 119.46 g/t gold over 4.89 m (hole G04-511), 87.88 g/t gold over 4.91 m (hole G04-527) and 97.61 g/t gold over 4.28 m (hole G04-524), all at shallow depths. These outstanding intersections are expected to improve resource classification at higher grades, thereby supporting open-pit expansion. Highlights from drilling the Vault deposit include 9.46 g/t gold over 11.46 m and 4.33 g/t gold over 14.35 m (hole VLT04-251) and 8.91 g/t gold over 4.67 m (hole VLT04- 230). Nine shallow holes tested a strike length of 1 km at the Crown target, located approximately 4.5 km north of Vault. Highlights include 4.04 g/t gold over 3.45 m and 10.25 g/t gold over 1.25 m.

MELIADINE WEST PROJECT

The Meliadine West deposits (Cumberland Resources Ltd., 78%; Comaplex Minerals Corp., 22%) are hosted within the Archean Rankin Inlet Group in the hanging wall of the Pyke Break deformation zone. The stratigraphy includes the Sam formation (metaturbidites), the Upper Oxide formation, and the Tiriganiaq formation (wackes and siltstones). These rocks structurally overlie, but stratigraphically underlie, mafic and ultramafic rocks with interlayered lean iron formation and variolitic flows. South of the Pyke Break, siltstones, wackes and polymictic conglomerate are the dominant rock types.

The Meliadine West property hosts 4.5 million oz of gold in four separate zones, of which the Tiriganiaq zone is the most advanced on the property.

Mineralization is hosted primarily within iron formation and associated metasedimentary rocks, and appears to be concentrated in high strain zones and at volcanic-sedimentary interfaces. Gold is associated with quartz-ankerite veins, variable pyrrhotite, coarse-grained euhedral arsenopyrite, and sericite alteration.

The focus of exploration in 2004 was primarily on the Main Tiriganiaq and West Tiriganiaq deposits. A total of 9297 m was drilled in 21 holes, with 7252 m completed on the West Tiriganiaq deposit, 1140 m on the Main Tiriganiaq deposit, and 905 m on reconnaissance targets near the Tiriganiaq structure. Highlights of 2004 drilling include 40.53 g/t gold over 16.18 m (when cut to 60 g/t), 33.92 g/t gold over 7.38 m, and 20.76 g/t gold over 6.0 m. All but one drillhole in Tiriganiaq West intersected significant mineralization and the deposit remains open at depth and along strike. Geological similarities suggest the potential for continuity between the West Tiriganiaq and the Main Tiriganiaq deposits. Two of four reconnaissance holes on a new shear zone target, 300 m south of the Main Tiriganiaq deposit, returned anomalous gold values. Surface exploration in 2004 delineated several new targets including the Noel target, where visible gold and assays up to 280 g/t gold were yielded from angular boulders, the source of which remains to be discovered. Assays of up to 19.5 g/t gold were attained from outcropping arsenopyrite-rich, siliceous iron formation with a minimum strike length of 250 m.

The results from the 2004 drilling campaign will be included in a new resource estimate as the project moves toward the feasibility study stage. The companies hopes to proceed with underground exploration plans and possibly with a trenching program in 2005. A geological re-interpretation of the deposit is also under way and will help the company assess which resources are best suited to open-pit extraction and which are more amenable to underground mining. The company intends to develop the Tiriganiaq deposit as a stand-alone operation first, and any resources from satellite deposits will contribute to extend the mine life.

CHURCHILL DIAMOND PROJECT

At the Churchill diamond project (Stornoway Diamonds Corp., Shear Minerals Ltd., BHP Billion Diamonds Inc.), the identification of 29 high-priority geophysical targets and the discovery of kimberlite float in 2002 triggered the current interest in this 3.4-Mha project. In 2003, 1500 till samples were collected and 8000 line-km of aeromagnetic surveys at a line spacing of 150 m were flown. This work resulted in the identification of 325 geophysical anomalies and impressive geochemistry, including a high proportion of G10 garnets. Sixteen kimberlites were drill-intersected in 2003, demonstrating that a new kimberlite district had been discovered.

In 2004, an impressive 4213 till samples were collected despite a late start and early shut-down due to inclement weather. A fixed-wing aeromagnetic survey totalling 16 575 line-km was flown in 2004, bringing the total magnetic surveying to 55 521 line-km since 2002. High-resolution EM surveys totaling more than 33 000 line-km were also conducted and 690 targets were identified in preliminary data from the first half of the survey. Six new kimberlites were discovered this year, bringing the total number of kimberlites on the Churchill property to 22. Three of these kimberlites are located in the southern indicator mineral corridor and three are within the Josephine River corridor. Representative samples were submitted to the Saskatchewan Research Council (SRC) for microdiamond analysis and results are pending. Samples were also submitted for petrographic and indicator analysis to assess the diamond potential.

As of October 19, 2004, 1732 samples had been processed and picking completed for 275 of these. Since 2001, more than 2700 microprobe-confirmed kimberlite indicator minerals (KIMs) have been recovered from 738 till samples (38% of all samples). Approximately 27% of all pyropes are G10s interpreted to be derived from within the mantle stability window. The bulk of these grains comes from four corridors, each approximately 15 km wide. Mineral chemistry indicates the preservation of a distinct cold geotherm beneath the Josephine River corridor, suggesting a large diamond stability window beneath the project area.

COMMITTEE BAY PROJECT

The Committee Bay greenstone belt is one of the largest under-explored greenstone belts in North America. The 300-km-long, northeast-trending belt comprises Archean supracrustal rocks of the Western Churchill Province. Rock types include komatiitic to basaltic volcanic rocks, intermediate to felsic rocks, and banded iron formation.

Committee Bay Resources Ltd. (CBR) currently holds 647 000 ha along this greenstone belt. Gold Fields Exploration Ltd., of South Africa, has earned a vested interest of 55% by accelerating its spending in the project over the past two years. CBR will remain the operator until the project reaches the prefeasibility study stage. In April 2004, CBR entered an agreement with Indicator Minerals Inc. whereby the latter can earn a 70% interest in the diamond rights to the more than 1.21 Mha of land held by CBR in Nunavut.

An aggressive $7.8 million exploration program was conducted on the project in 2004, including about 6500 m of drilling in 44 holes, an airborne EM survey, and ground magnetics and induced polarization (IP) surveys.

At least 52 gold occurrences have currently been identified on CBR's Committee Bay property with grades ranging up to 288.85 g/t gold and 1769.5 g/t silver. A 5.5 line-km IP survey was completed over one occurrence this year.

Qikiqtani Region

In the Qikiqtani/Baffin region, exploration has been increasing significantly each year for the last three years. While the main focus of exploration in the Qikiqtani/Baffin region is diamonds, there is a diversity of other commodities being sought, including gold, silver, iron, sapphires, coal and building stone. The Brodeur and Melville peninsulas have been the main hub of diamond exploration in the region.

AVIAT PROJECT

The Aviat project (Stornoway Diamonds Corp., BHP Billiton Diamonds Inc., Hunter Exploration Group), located on the Melville peninsula, consists of 2.23 Mha of prospecting permits. Stornoway Diamond Corp. is the operator and carries a 70% interest in the property.

The Aviat 2 kimberlite was discovered in the summer of 2003 and Aviat 4 was discovered in the summer of 2004. Aviat 3 and Aviat 5 are, at the time of writing, discoveries of large kimberlitic boulders up to 2.2 m across. To date, Aviat 1, 2 and 4 have been drilled and are confirmed to be kimberlite bodies. Aviat 1 and 2 have been shown to be diamondiferous. Aviat 1, from a mini-bulk sample of 7.4 tonnes (t), has yielded a grade of 0.88 carats/tonne (ct/t).

In 2004, extensive work was carried out on the Aviat property during the summer field season. A total of 4175 till samples were collected, 6200 line-km of Falcon™ airborne gravity survey were flown, approximately 27 000 line-km of helicopter-borne magnetic and electromagnetic surveys were flown, and 33 ground geophysical grids over potential targets were surveyed. Diamond drilling totaling 2024 m was carried out in the spring and defined the Aviat 1 as a multi-phased body comprised of hypabyssal and tuffisitic kimberlite. This drilling also produced 2.5 t of kimberlite from the Lake zone for macrodiamond analysis.

JACKSON INLET PROJECT

Since acquiring the Jackson Inlet property in 2000, Twin Mining Corporation has added substantially to its land holdings on the Brodeur Peninsula and has at least four kimberlite bodies, including the Freightrain occurrence.

In February 2004, Twin Mining announced that it had discovered 12 new clusters of kimberlite indicator minerals (KIMs) from its work in 2003. Seven of the twelve clusters of indicators are located on the eastern half of Twin Mining's new claim block and several of the clusters coincide with airborne magnetic anomalies and intersecting structures. The remaining five KIM clusters are within 3-6 km of the Freightrain and Cargo 1 pipes. However, the company surmises that, because of the high number of KIMs within the five clusters, there may be other kimberlite bodies hidden under shallow overburden.

During the summer of 2004, Twin Mining performed 15 700 line-km of "Midas" airborne geophysical survey on Block 1 (Jackson Inlet East) and Block 2 (Jackson Inlet West). The company also collected 1200 till and stream sediment samples on the joint-venture (with Stornoway Diamond Corporation) Vista property (south block). No results from this till sampling have been reported to date. The airborne geophysics resulted in 42 anomalies on Block 1 (Jackson Inlet East); 18 of the anomalies are considered to be significant and cross up to five flight lines. On Block 2 (Jackson Inlet West), the survey revealed seven significant geophysical anomalies that cross at least three flight lines.

OZ SERIES PROJECT

Kennecott Canada Exploration Inc. has been actively exploring for diamonds on the Brodeur Peninsula since 2001. In 2004, Kennecott added 15 prospecting permits to its land holdings on the southern half of Baffin Island. Expenditures for the 2004 exploration program are approximately $3 million. Exploration work has included geological mapping, till and sediment sampling, diamond drilling, and 15 700 line-km of airborne magnetometer survey.

Earlier in the year, Kennecott announced the discovery of three diamondiferous kimberlites on the Brodeur Peninsula, the largest of which measured 250 m x 150 m. This kimberlite was drilled and produced 1520 kg of drill core for a mini-bulk sample. A total of 319 diamonds were recovered from the sample and showed a coarse diamond distribution similar to that of the Freightrain kimberlite. Little information has been released about the other two kimberlites.

QIMIQ PROJECT

BHP Billiton and Falconbridge Limited received prospecting permits covering an area of the Paleoproterozoic Piling Group in 2000. BHP Billiton also obtained 10 NTI leases covering the Inuit Owned Lands (IOL) in the area. Under an agreement signed in 2003, Commander Resources Ltd. can earn a 100% interest in the gold rights to the property by spending $10.2 million on BHP Billiton's permits by the end of 2012 and by spending $8.0 million on the Falconbridge permits by the end of 2011. The Piling Group is a Paleoproterozoic supracrustal assemblage that is part of the Foxe fold belt on the northern margin of the Trans-Hudson orogen and is comprised of a diverse lower package of siliciclastics, volcanic flows and volcaniclastics, and an upper succession of greywacke-turbidites.

Commander Resources has been examining the silicate iron formation within the Bravo Lakes Formation of the Piling Group for gold mineralization and the work has returned significant values. This iron formation is very similar in the style of mineralogy and mineralization to the Musselwhite deposit in northwestern Ontario and to the Homestake mine in South Dakota. This year's work on the Qimiq project included 39 shallow drillholes (3617 m) at Malrok Lake and 12 holes in the Ridge Lake area, 30 km east of Malrok Lake. Both drill programs produced encouraging results and significant intersections. One thousand regional rock samples were collected and submitted for assay; the results of these assays are pending. A new iron formation-hosted gold showing (the Durette showing) was discovered through prospecting in summer 2004 and lies 50 km east of the Ridge Lake showing, from which grab samples yielded results of up to 46.9 g/t gold. The summer's exploration program also included prospecting, geological and structural mapping, and soil sampling in the area of Malrok Lake.

QILALUGAQ PROJECT

BHP Billiton Diamonds Inc.'s Qilalugaq project consists of 405 claims on the southwest end of the Melville Peninsula. The property lies between Repulse Bay and Committee Bay. Work on the property started in 2000; in 2004, a 45-person camp was established approximately 12 km from the Hamlet of Repulse Bay.

To date, a cluster of nine kimberlite bodies have been discovered on the Qilalugaq property. One of the kimberlite bodies (Qilalugaq) was the subject of a mini-bulk sample and 9.37 t of material was taken yielding a grade of 0.25 ct/t. This grade was considered sufficient to warrant a 237-t bulk sample from which results are still pending.

To date, BHP Billiton has collected 7065 till samples, flown in excess of 70 000 line-km of airborne geophysics, including 19 100 line-km of FALCON™ airborne gravimetric survey, and conducted delineation and target testing diamond drilling amounting to 7145 m.

MARY RIVER IRON ORE DEPOSITS

The Mary River iron ore deposits on north-central Baffin Island were first discovered in 1962. Between 1963 and 1965, exploration work took place on the claims and five high-grade iron deposits were identified. Most of the exploration work was performed on the #1 deposit, including 3319 m of core drilling and the tracing of the iron formations through airborne and ground geophysics, geological mapping and trench sampling of each of the identified deposits. A bulk sample was also taken for metallurgical testing.

Since the 1970s, the property has remained dormant with a resource estimate of 116.7 Mt grading 68.3% iron with low levels of deleterious elements. In 2004, Baffinland Iron Mines Corporation carried out an exploration program that consisted of 2813 m of diamond drilling, predominantly on the #1 deposit. Baffinland reports that the diamond drilling shows that the width of the hematite ore is increasing with depth and that the summer drilling program has more than doubled the strike length of the #1 deposit to 2.8 km from 1.2 km. Evaluation of lump iron ore quality will be carried out at SGS Lakefield Research in Ontario.

BAFFIN ISLAND PROPERTY

De Beers Canada Exploration Inc. has been exploring for diamonds on Baffin Island since 2001 and has performed extensive till and stream sampling, ground and airborne geophysics, reverse circulation drilling and diamond drilling.

In February 2004, De Beers was granted another 16 prospecting permits immediately to the west of its existing permits. The 2004 exploration program included till and stream sediment sampling, ground geophysics, prospecting, and diamond drilling. The chemistry of the kimberlitic material recovered is very favourable. However efforts to pinpoint its exact source have so far not succeeded, although till sampling has allowed the company to significantly narrow down the possible location.

Kitikmeot Region

The Kitikmeot region spans the western and northern mainland of Nunavut, and parts of Victoria, Prince of Wales, King William, and Somerset islands. Kugluktuk and Cambridge Bay are the largest communities in the region and provide services to exploration projects in the area. Yellowknife, to the south in the Northwest Territories, is also an important logistical centre.

The Kitikmeot region is geologically diverse; its westernmost portion is underlain by rocks of the Archean Bear Province and the Archean Slave Province occupies part of the western mainland and is overlain to the west and east by the Paleoproterozoic siliciclastic and carbonate rocks of the Wopmay Orogen. This Orogen separates the rocks of the younger Bear Province from the Slave Province. Inliers of Paleoproterozoic rocks are found on Victoria Island, overlain by the Paleozoic Arctic Platform sedimentary rocks that cover most of the islands. In the east Kitikmeot, the Slave Province is separated from the Western Churchill Province (Archean to Paleoproterozoic) by the Paleoproterozoic Thelon Orogen (around 1.9 billion years old); the Churchill province underlies most of the northern and northeastern mainland.

Past producers in the region have generally been small with mines at Roberts Bay, Ida Bay, and Ida Point, south of Elu Inlet. The Lupin gold mine, having produced over 3.1 million oz of gold since 1982, is currently winding down with the pillars of the mine currently being extracted.

Diamonds and gold were the two primary commodities sought by companies in the Kitikmeot in 2004. Recent diamond exploration covered virtually the entire western mainland and parts of Victoria and Somerset islands. The Coronation Gulf area of the Kitikmeot experienced a staking rush in December 2003 when a record number of mining permits were issued in Nunavut. There was an overall increase in recorded mineral claims and most land in the Coronation Gulf area is currently claimed. Diamond activity in this area and on Victoria Island (Diamonds North Resources Limited/Teck Cominco Limited) has resulted in better definition and understanding of kimberlite trends and bodies.

BLUE ICE PROJECT

The Blue Ice project is the most advanced of the Victoria Island projects of Diamonds North Resources Ltd. and Teck Cominco Ltd. The Blue Ice project covers over 200 000 acres and straddles the Nunavut/Northwest Territories border. To date, 16 kimberlites, 14 of them diamondiferous, have been reported on the island. Kimberlite dykes, totaling 25 km in length, have been inferred from geophysical surveys and limited drilling.

Drilling by Diamonds North has identified a cluster of four kimberlites named Apollo, Neptune, Diana and Pluto. A fifth kimberlite, Juno, was discovered near the King Eider kimberlite.

Exploration efforts since 2002 have focused on the 20-km-long Galaxy and 25-km-long King Eider confirmed kimberlite trends, two semi-parallel, northwest-southeast trending structures 30 km apart. Both trends contain large diamonds, which makes both exciting targets. In 2003, Diamonds North entered into a participation agreement with Teck Cominco and, in 2004, the exploration program focussed on drilling and geophysical surveys. Up to 10 new priority magnetic and EM targets were identified by the airborne surveys.

GEORGE LAKE/GOOSE LAKE (BACK RIVER) GOLD DEPOSITS

The George Lake and Goose Lake gold deposits are hosted within units of banded iron formation within greywacke folded into an anticline, with the apex of the fold forming a hinge zone near surface. Mineralization occurs in both the high-grade hinge fold zone and the greywacke zone within the core of the fold. Both the George and Goose Lake deposits are on Subsurface IOL, subject to grandfathered mineral claims and leases.

Total indicated and inferred resources for George Lake have been calculated at 7.806 Mt grading 11.25 g/t gold for 2.8 million oz. In 2002, Kinross Gold Corp. outlined the Goose Lake indicated resources as 4.37 Mt grading 9.8 g/t gold, with an inferred resource of 1.88 Mt grading 9.9 g/t gold.

In early 2004, Kinross and Miramar Mining Corporation finalized a joint-venture agreement on these two projects. Miramar designed its exploration program to add to the production capacity of Hope Bay by doubling existing resources at Goose Lake, to treat George Lake as a satellite deposit, and to test-drill this deposit.

Drilling (41 holes for 11 090 m) in September 2004 resulted in high-grade, near-surface mineralization in the hinge zone (16.8 m averaging 36.3 g/t gold). A zone of significant gold mineralization (8.0 m averaging 10.2 g/t gold), hosted in greywacke, was identified in the core of the fold. An area south of the current resource returned significant gold values over considerable widths.

HACKETT RIVER

The Hackett River property is an advanced-stage base- and precious-metal property consisting of three mining leases and one surface lease covering approximately 7144 ha, located 480 km northeast of Yellowknife. In early 2004, Sabina Resources Limited signed an agreement with Teck Cominco Limited in which Sabina can earn a 100% interest in the property.

Hackett River contains five delineated deposits that host in aggregate approximately 21 Mt, making Hackett River one of the largest undeveloped massive sulphide deposits in Canada. The Main West zone (the West Limb "A" zone or Main Camp Lake zone) has an identified resource of 4 Mt grading 1.38% lead, 12.76% zinc, 0.46 g/t gold and 231.1 g/t silver to a depth of 200 m where it remains open. This zone plunges steeply to the southwest and is characterized by massive sulphides underlain in part by copper-rich stringer mineralization. The other four zones are the Main East zone (2.05 Mt grading 0.57% copper, 1.13% lead, 8.24% zinc, 0.86 g/t gold and 166.97 g/t silver), the East Cleaver zone (4.57 Mt grading 0.33% copper, 0.90% lead, 6.84% zinc, 0.34 g/t gold and 160.11 g/t silver), the Knob Hill zone and the Boot Lake zone, both located between the Main Camp Lake zone and the East Cleaver zone.

Recent drilling (44 holes) has intersected high-grade gold, silver and zinc zones; assays have been received from 19 holes and results are spectacular with four high-grade mineralization zones. The first zone consists of copper-rich massive sulphides running 4.72% copper, 0.24% lead, 2.85% zinc, 661.3 g/t silver and 2.19 g/t gold across 15.0 m. The second zone intersected a precious-metal-rich horizon with values of 11.41 g/t gold and 1471.3 g/t silver across 15.1 m. The third zone, consisting of zinc-rich massive sulphides, assayed 2.55% lead, 10.71% zinc and 235.8 g/t silver across 20.65 m. The fourth zone consisted of zinc-rich massive sulphides and assayed 1.21% lead, 23.63% zinc and 127.0 g/t silver across 2 m.

HIGH LAKE

The High Lake copper-zinc-silver-gold property (Wolfden Resources Inc.) consists of 15 leases (1710 ha) located mainly within a Subsurface IOL parcel. However, the mining leases are "grandfathered" and are exempt from NTI ownership as long as tenure is maintained.

The High Lake property is underlain by north-trending Archean basaltic to rhyolitic flows and fragmented volcanic rocks in the northern part of the High Lake greenstone belt. Felsic volcanic rocks dominate over mafic rocks throughout the belt, contrasting with other Slave province greenstone belts. Late Archean plutonic rocks intrude the supracrustal rocks in the western part of the property.

Mapping, sampling, geophysical surveys and drilling were completed in the late 1950s by Kennarctic Explorations. This work led to a reserve estimate of 1.16 Mt grading 5.37% copper and 1.04 g/t gold (A zone), 0.58 Mt grading 6.09% copper (B zone), and 1.83 Mt grading 2.51% copper, 4.2% zinc and 29.6 g/t silver (D zone).

In 2003, a new massive sulphide horizon, the West zone, was discovered at High Lake, 1.7 km west of the A/B and D zones. Over 20 000 m of drilling has been conducted to date and drilling continues to expand the West zone. Step-out drilling has returned intersections of up to 5.5 m grading 2.40% copper, 4.90% zinc, 177.15 g/t silver and 4.14 g/t gold. The deepest hole (700 m) drilled at the north end of the West zone has returned the thickest interval of mineralization, suggesting that the deposit is open at depth. Grades of 3.07% copper, 0.52% zinc, 48.10 g/t silver and 1.30 g/t gold over 45.70 m and 19.00 m grading 4.27% copper have been intersected. Further deep drilling in 2004 returned impressive results of 50.85 m grading 0.81% copper, 7.59% zinc, 103.33 g/t silver and 3.81 g/t gold.

HOPE BAY PROJECT (DORIS NORTH, MADRID, BOSTON)

The Hope Bay project was again the largest exploration project in Nunavut. This project, 100% owned by Miramar Mining Corporation, lies within the Hope Bay greenstone belt that extends over 1000 km^2 and is one of the most prospective undeveloped greenstone belts in Canada. The belt contains a number of significant gold deposits; three have been defined on the Hope Bay project, namely the Boston, Doris and Madrid (with Naartok and Suluk) deposits. Current resource estimates are 5.4 million oz of gold with measured and indicated resources of 1.8 million oz at 9.9 g/t gold and an inferred resource of 3.6 million oz at 6.9 g/t gold. The resource continues to increase with additional work as significant discoveries deep in the Boston deposit and at Naartok were made in 2003-04. All deposits remain open to expansion.

Miramar controls most of the Hope Bay belt (approximately 250 000 acres) and large portions of the ground are Inuit-owned and administered by NTI. The belt, 80 km long in a north-south direction and 7-20 km wide, is located in the northeast corner of the Slave Province and is a typical Archean greenstone belt, comparable to the Yellowknife, Kirkland Lake and other prolific gold belts. The belt comprises lower greenschist facies mafic metavolcanic and metasedimentary rocks with amphibolite facies rocks along the eastern and western margins of the belt where Archean granitoid rocks have been intruded. The belt has been deformed during multiple events and is transected by major north-south trending altered shear zones. Its features are similar to those of other major gold deposits in Archean greenstone belts.

The Doris deposit is situated at an inferred inflexion in the Hope Bay structural break and consists of a steeply dipping, over 3-km-long quartz vein system in folded and metamorphosed pillow basalts. At the north end, the veins are folded to create a high-grade anticlinal hinge zone lying close to surface (Doris North).

In January 2003, a feasibility study of the Doris North deposit was completed and predicted production of 311 000 oz of gold in the first two years. The Inuit Impact and Benefits Agreement (IIBA) between Miramar and the Kitikmeot Inuit Association (KIA) relating to the gold mine development was signed in early 2004. However, in August 2004, the Nunavut Impact Review Board (NIRB) determined that the Doris North project could not proceed to the regulatory phase of permitting until a new Environmental Impact Statement application with additional information in five target areas (dealing with wildlife and design concerns) was provided to the NIRB. Miramar is close to completing the supplemental information.

The Boston deposit is located near the south end of the belt and is associated with a flexure in the Hope Bay structural break. Gold and sulphides (mostly pyrite) are found in clots within quartz veins and within the wall-rock halo. Measured and indicated resources are 687 000 oz at 15.4 g/t gold and inferred resources are 900 000 oz at 10.9 g/t gold. The best gold mineralization occurs in altered zones within a large iron-rich carbonate altered shear system.

In 2004, 35 holes (20 157 m) were drilled at Boston. Drilling results exceeded expectations (hole 304 intercepted 6.6 m grading 21.7 g/t gold) and added new mineralized areas; 16.2 g/t gold over 9.5 m was intercepted in an area outside the existing resource. Furthermore, deep drilling encountered significant mineralization (28.9 g/t gold over 3.8 m and an exceptional 461.3 g/t gold over 0.5 m) in an area of about 400 m by 500 m below the level of the existing resources.

At the Madrid deposit, 2003 resource estimates suggest an indicated resource of 565 000 oz of gold grading 4.9 g/t gold and inferred resources of 1 886 000 oz of gold of similar grade. In 2001, drilling tested several targets along the 11-km-long Deformation zone southeast of Madrid and two new significant gold showings, Naartok and Suluk, were defined. Naartok's mineralization is hosted by a west-trending, steeply north-dipping alteration zone (dolomite-sericite-silica-albite) of disseminated, stockwork, and breccia-style gold-pyrite mineralization within mafic volcanic rocks. Drilling of 17 holes (7281 m) in 2004 has more than doubled the limits of the known mineralization at Naartok. Step-out drilling intercepted 18 m averaging 6.5 g/t gold (including 6.1 m averaging 10.1 g/t gold and 6.2 m averaging 9.0 g/t gold).

JAMES RIVER (NORTH JAMES RIVER)

The Cygnet Lake gold zone was previously discovered and evaluated by BHP Minerals. Gold mineralization along a 3-km strike length is associated with varying amounts of pyrite and arsenopyrite in linear zones of silicification and quartz veins. Pure Gold Minerals Inc. and Bard Ventures Ltd. are working on two promising showings, the Silver Bullet and the Black Ice showings. At the Silver Bullet showing, previous surface sampling returned values of up to 154 g/t gold and, on the Black Ice zone, values were up to 21 g/t gold.

Exploration work in 2004 focused on the evaluation of airborne magnetic-EM survey anomalies, interpreted and further defined by ground UTEM and magnetic surveys in 2003. Visible gold was found during detailed channel sampling. Mineralization of up to 82.4 g/t gold was confirmed over a 50-m strike length and a grade of 60.3 g/t gold was returned over 1.2 m at the Silver Bullet showing. A grab sample collected from a separate vein set 50 m east of the mineralized zone returned 86.4 g/t gold. Fifteen channel samples collected from the 50-m vein exposure returned an average grade of 11.8 g/t gold. Twenty-six channel samples, varying in width from 0.4 to 1.3 m, were collected from the Black Ice showing. Values of 10.1 g/t gold and an average of 1.6 g/t gold over a strike length of 40 m were determined.

JERICHO DIAMOND PROJECT

In 1992-93, Lytton Minerals and New Indigo Resources staked the Jericho, Contwoyto and Burnside claim group (437 000 acres) around the northern end of Contwoyto Lake. Extensive airborne geophysical surveys were flown and thousands of till samples were collected. Drilling in 1995 resulted in the discovery of the JD/OD-1 kimberlite and the JD/OD-2 kimberlite and, in 1996, the JD/OD-1, or Jericho pipe, was outlined by 28 000 m of drilling. JD/OD-3, also known as Nazareth, was discovered, but neither it nor the JD/OD-2 pipe warranted further exploration. A decline was driven into the Jericho pipe in 1997 and 14 555 t of kimberlite was mined for bulk sampling; 9435 t were processed at the Lupin mine site with 10 535 ct recovered. The Contwoyto-1 kimberlite was found on the Contwoyto claim group in 1999.

Tahera Diamond Corporation entered the environmental review process in 2000 for the development and operation of the Jericho diamond mine and to date has completed the necessary regulatory requirements to all organizations. A feasibility study was commissioned in 2003. Tahera received federal approval in June 2004 for the project to proceed and, in early September, the company and the Kitikmeot Inuit Association (KIA) signed the formal Inuit Impact and Benefits Agreement (IIBA). In October 2004, Tahera entered into an agreement with Tiffany and Co. for the purchase and marketing of the diamonds; Tiffany will also provide $35 million to assist with the project financing.

Tahera is currently in the water permit hearing stage with the Nunavut Water Board; its application for a Type A licence has been accepted and the final hearing is set for early December 2004. This schedule meets the company's timetable to begin construction in 2005 and to complete the ice road from the Lupin mine to Jericho. Commercial production is planned for early 2006. The project is planned to have a life of nine years (2005 to 2014) and current proven reserves are defined as 2.6 Mt averaging 1.2 ct/t. The mine will be an open-pit mine for years 1 to 4, processing 330 000 t per year on site, followed by underground mining.

MUSKOX PROJECT

The 1.27 billion-year-old Muskox Intrusion (MI) is a layered mafic/ultramafic complex intruding the Paleoproterozoic Coronation Supergroup and is one of the world's largest intrusions. It occupies a triangular, trough-shaped, magmatic chamber up to 20 km across, extending to a depth of 1.8 km and is exposed over 125 km. Geophysical data suggest that the intrusion continues for another 250 km under cover rocks.

The MI was first discovered in 1956 by INCO and was examined between 1969 and 1988 by various companies. Muskox Minerals Corp. staked and negotiated Inuit Concession Agreements (later transferred to Exploration Agreements) in 1995-97. The best assay from a grab sample is 160 g/t palladium plus platinum plus gold and over 20% combined copper and nickel. The best drill results from 2001 was an intercept grading 1.28% copper, 0.45% nickel, 1.20 g/t palladium, and 0.18 g/t platinum over 15 m.

Muskox and former partner Anglo American Exploration Canada (AAEC) conducted airborne SPECTREM geophysics in 2003 and identified 21 conductive targets later followed up by ground surveys. Drilling intersected up to 1.22% nickel, 0.76% copper, 0.03% cobalt, 340 parts per billion (ppb) platinum and 1150 ppb palladium over 0.61 m in low-sulphide footwall paragneiss. In May 2004, AAEC and Muskox Minerals terminated their option agreement. Exploration expenditures by AAEC exceeded $2.5 million and included the integration of existing data, a regional Spectrem airborne survey, soil geochemistry, ground UTEM and PEM surveys, and diamond drilling.

ULU PROJECT

Wolfden Resources Inc. is the current owner and operator of the Ulu project, which is hosted in amphibolite facies mafic metavolcanic rocks of the High Lake volcanic belt. The claims have seen extensive drilling between 1989 and 1996; in 1995, Echo Bay Mines Ltd. (the owner at the time) estimated a resource of 1.5 Mt grading 12.78 g/t gold for the Flood zone. The main Ulu claims (Ulu 1 to 4) cover a 2- to 3-km-wide lobe of supracrustal rocks surrounded by granite. The property has excellent exploration potential as demonstrated by the untested Ravine showing where prospecting has returned assays of 36.2 g/t gold and 26.0 g/t gold. Rubbly gossanous quartz veins to the north and south yielded gold values between 22.8 and 89.1 g/t (2.6 oz/ton).

Recent drilling by Wolfden intersected high-grade gold below the known resource, as well as massive sulphides parallel to the main gold zones. An ongoing drill program is designed to expand the Flood zone and explore for additional lenses below the main deposit. Drilling has identified continuity of gold mineralization in the Deep zone down-plunge from the main Flood zone. Initial drilling in the Deep zone has returned gold intersections of 21.18 g/t across 2.4 m and 11.24 g/t across 4.0 m. Drilling of this zone is continuing and results indicate the potential to increase the current resource at Ulu. In addition, massive sulphide mineralization at the basalt-sediment contact, parallel to the Flood zone mineralization, yielded 7.48% copper, 6.94% zinc, 148.6 g/t silver and 1.05 g/t gold across 1.9 m.

Coronation Gulf

The Coronation Gulf diamond district, southeast of Kugluktuk, covers the northern portion of the Archean Slave Province and hosts over 20 kimberlites, some significantly diamondiferous. The first kimberlite, the Potentilla, was discovered in 2001 and started a four-million-acre staking rush that encompassed the majority of this diamond district. Numerous companies are working in this area and notable kimberlites include Ashton Mining of Canada's diamondiferous Artemisia and Thrift kimberlites and Ashton and Stornoway's Potentilla and Stellaria kimberlites.

ASHTON MINING OF CANADA PROPERTIES

Ashton holds a 100% interest in six properties totaling 197 000 ha. These properties are the Vic, Kim, Ric, Eokuk, Fairy River and James River properties. Ashton also has a 52.5% interest and a right to earn an additional 7.0% interest in the 16 000-ha Kikerk Lake project with Caledonia Mining Corporation and Stornoway Diamond Corporation. Ashton's 2004 summer exploration program in the Slave craton focussed primarily on the Kikerk Lake property and its 100%-owned properties in the Coronation Gulf. Programs consisted of the collection of over 1200 indicator mineral samples to assist in prioritizing previously identified geophysical targets and indicator mineral anomalies; laboratory results of samples collected are expected early in 2005. On the Kikerk property, an outcrop of a kimberlite dyke (approximately 2 m wide) was discovered; the extent and size of this dyke is not known. However, caustic dissolution analysis of a few hundred kilograms of this kimberlite suggests that the diamond potential of the dyke is low.

NAPAKTULIK LAKE PROPERTY

Strongbow Exploration Inc. holds varying interests in more than 263 000 ha of ground in the Coronation diamond district. The company's 100%-owned Napaktulik Lake diamond property, located within 5 km of at least two kimberlite bodies, comprises 18 959 ha of Inuit Owned Lands subject to the NTI Agreement. Limited sampling conducted by Strongbow in 2003 returned anomalous numbers of kimberlite indicator minerals from 33 of 39 collected samples, including pyrope and eclogitic garnet, chromite, and ilmenite grains. Data from a detailed helicopter-borne magnetic-EM survey covering the property delineated a number of potential kimberlite targets. A property-wide till sampling program was completed during 2004, the results of which will be used to further define target areas within the property.

JUBILEE PROJECT

The Jubilee project (Stornoway Diamond Corporation [50%], Nordic Diamonds Ltd. [25%] and International Samuel Exploration Corp. [25%]) spans 137 250 acres. In 2004, exploration spending on this project totaled $700 000. The work was focussed on the collection of over 600 till samples to help resolve internal variation within strong and laterally extensive regional mineral trains that were identified by earlier till sampling and airborne magnetics. Exploration efforts were also used to identify and differentiate locally sourced mineral indicator trains that would signify unrecognized kimberlitic bodies on the property; work has indicated four or five anomalous areas of immediate interest.

CORONATION PROPERTY

Shear Minerals Ltd. also holds ground in this region with its Coronation property, consisting of 58 claims in three non-contiguous claim groups totaling 79 500 acres. Shear acquired the properties in 1997 and, in 2002, advanced the project to the drilling stage of four medium-priority targets following ground geophysical data and supporting kimberlite indicator mineral anomalies from till samples. Mapping, sampling and additional till sampling have been undertaken; results are pending.

3. Canadian Exploration Activity Around the World

3.1 INTRODUCTION

This section provides an overview of Canadian mineral exploration activity[24] abroad. It also highlights the domestic and foreign components of the larger-company exploration market in Canada. The information in this review[25] was current as at August 2004.

3.2 GLOBAL MARKET FOR MINERAL EXPLORATION

During 2003, investors were much more willing to invest in mineral exploration than they had been in the previous few years. Over $12.7 billion in equity financing was raised for exploration and development projects around the world during that year.[26] More than 45% of the new funds raised was for companies listed on Canadian stock exchanges.

As a result of rising investor sentiment, worldwide budgets (**Table 24**) for exploration programs for precious metals, base metals and diamonds rose to an estimated $3.5 billion (US$2.4 billion) in 2003, up in constant Canadian dollars by more than 13% from $3.0 billion the previous year.[27] This total includes budgets reported by the larger companies, those reported by the smaller companies, and those reported by companies that planned to spend relatively insignificant amounts on exploration, as well as estimates for companies that do not make their exploration plans public.

The number of companies that reported significant exploration plans, defined here as those with budgets of at least $145 000 (US$100 000), rose to 917 in 2003, or up by 27%, from 724 companies the previous year. Of those 917 companies, 585, or 64%, were based in Canada.

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[24] Most of the statistical data on the larger-company mineral exploration market are based on *Corporate Exploration Strategies: A Worldwide Analysis*, published annually by Metals Economics Group, Halifax, Nova Scotia. MEG counts, as exploration, work from the earliest stage through perimeter drilling, reconnaissance and evaluative forays, as well as work to further quantify and define an identified orebody once the target outline stage has been completed. It also counts as exploration all feasibility work up to the point of a production decision. The information on specific projects is based on company reports.

[25] Chapter 3 of this report is a summary of an article from the 2003 *Canadian Minerals Yearbook* published by Natural Resources Canada (available on the Internet at www.nrcan.gc.ca/mms/cmy/2003/CMY_e.htm).

[26] *Mining and Exploration Company Financings: Monthly Records and Historic Trends, December 2003*, Gamah International Limited, Toronto, Ontario, January 2004, Section II, pp. 1-108.

[27] Unless indicated otherwise, all currencies in this review are expressed in Canadian dollars and currency comparisons between years are expressed in constant Canadian dollars.

TABLE 24 WORLDWIDE EXPLORATION BUDGETS FOR PRECIOUS METALS, BASE METALS OR DIAMONDS, BY DOMICILE AND TYPE OF COMPANY, 2003

	Canada	Australia	Africa-Middle East	Europe-FSU	United States	Latin America	Other Asia-Pacific	Unspecified Domicile	Total	Proportion of Subtotal
					($ millions)					(%)
Larger companies	798	324	477	324	267	214	18	–	2423	76
Smaller companies	464	224	2	33	17	8	7	–	756	24
Subtotal	1 262	548	479	358	284	222	25	–	3 179	100
Other companies	. .	. .	. .	. .	. .	. .	. .	300	300	
Total	1 262	548	479	358	284	222	25	300	3 478	

Source: Natural Resources Canada, based on *Corporate Exploration Strategies: A Worldwide Analysis*, Metals Economics Group, Halifax, Nova Scotia.
– Nil; . . Not available.
Notes: (1) "Larger companies" are defined here as those with budgets for mineral exploration in 2003 of $4.3 million (US$3 million) or more. There were 100 such companies in 2003. These companies usually account for roughly 80% of annual global exploration budgets. There are 12 years of data available for these companies. The focus of this paper is on the larger companies. (2) "Smaller companies" are defined here as those with budgets for mineral exploration in 2003 of at least $145 000 (US$100 000), but less than $4.3 million (US$3 million). There were 817 such companies in 2003. General comments about these companies as a group appear in this paper. (3) "Other companies" include those with budgets for mineral exploration in 2003 of less than $145 000 (US$100 000). This category also contains estimates for those companies for which data are otherwise unobtainable. There were more than 300 such companies in 2003. These companies are ignored in this paper.

As a group, these 917 companies planned to undertake exploration programs in 95 countries, about the same number as in 2002. Compared with the previous year, their budgets in 2003 increased in almost 60% of the countries in which they planned to operate. Their year-over-year budgets grew (in constant Canadian dollars) by $170 million in Canada, by $90 million in South Africa, by $30 million in Mexico, by roughly $20 million in each of Ghana, the United States and Venezuela, and by $10 million or more in each of Botswana, Chile, China and Mongolia. In countries where decreases in their total budgets were expected to occur between 2002 and 2003, they were all relatively small, the largest ones no more than roughly $10 million in each of Argentina and Tanzania.

3.3 WORLD'S LARGER COMPANIES

Global trends in mineral exploration are based on data for the world's larger companies. These companies (**Table 24**) are defined here as those with annual exploration budgets of at least $4.3 million in 2003 (current US$3 million annually). The larger companies are the only ones for which there are consistent multi-year data on worldwide exploration activities. There are currently 12 years of such data available. Therefore, the focus here is on this group of companies.

During 2003, the world's larger companies were expected to undertake exploration programs with a combined value of $2.4 billion (US$1.7 billion) in 68 countries, three more countries than in 2002. In 2003, there were 100 such companies based around the world, compared with 96 in 2002; in 1997, the number stood at 279, a record high.

Although, in 2003, the world's 100 larger companies represented only about 11% of the 917 companies that reported exploration budgets, they accounted for more than 76% of the value of their programs (**Table 24**). In 2002, when there was less financing available for the smaller companies, the larger ones accounted for 13% all companies reporting exploration budgets and for 79% of the value of their programs.

In 2003, on a commodity basis, the larger companies accounted for 84% of the value of all programs worldwide aimed at base metals, for 81% of those aimed at diamonds, for 72% of those aimed at gold, and for almost 69% of those aimed at platinum group metals (PGM). On a regional basis, the larger companies accounted for 85% of the value of all the exploration programs planned for Latin America and the Caribbean, for 84% of those planned for Europe and the former Soviet Union (FSU), for 82% of those planned for Africa and the Middle East, for 80% of those planned for the United States, for 70% of those planned for Asia-Pacific, and for 64% of those planned for Canada.

3.4 WORLD'S SMALLER COMPANIES

The world's smaller companies (**Table 24**) are defined here as those planning to spend at least $145 000 (US$100 000), but less than $4.3 million (US$3 million) on mineral exploration in 2003. During 2003, the world's smaller companies were expected to undertake exploration programs around the world with a combined value of $756 million (US$522 million).

The smaller companies are an important component of mineral exploration and development in many regions of the world, but especially in Australia and in Canada. In many countries, the smaller companies are the only ones that undertake mineral exploration. In 2003, there were 27 such countries.

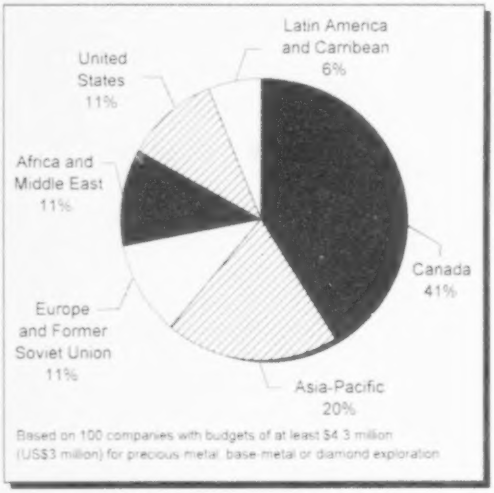
There were 817 smaller companies in 2003. Two-thirds of these companies were based in Canada and about one-third of their combined budgets was destined for this country.

The smaller Canadian-based companies accounted for 37% of the budgets of the smaller and larger Canadian-based companies combined; in Australia the comparable figure is 41%. The smaller Canadian companies planned to spend $244 million in Canada, or 53% of their total budgets of $464 million; in Australia, the comparable figures are $169 million, or 75% of total budgets of $225 million.

Although the smaller companies accounted for 24% of reported exploration budgets worldwide in 2003, their activities are not addressed specifically here.

3.5 LARGER CANADIAN-BASED COMPANIES

Figure 36
Distribution of the World's Larger Exploration Companies, by Domicile, 2003



Based on 100 companies with budgets of at least $4.3 million (US$3 million) for precious metal, base-metal or diamond exploration.

Source: Natural Resources Canada, based on *Corporate Exploration Strategies: A Worldwide Analysis*, Metals Economics Group, Halifax, Nova Scotia.

There are more mineral exploration companies based in Canada than in any other country. More than 40% of the world's larger companies are based in Canada (**Figure 36**). In 2003, there were 41 of the larger companies based in Canada, up from 37 in 2002.

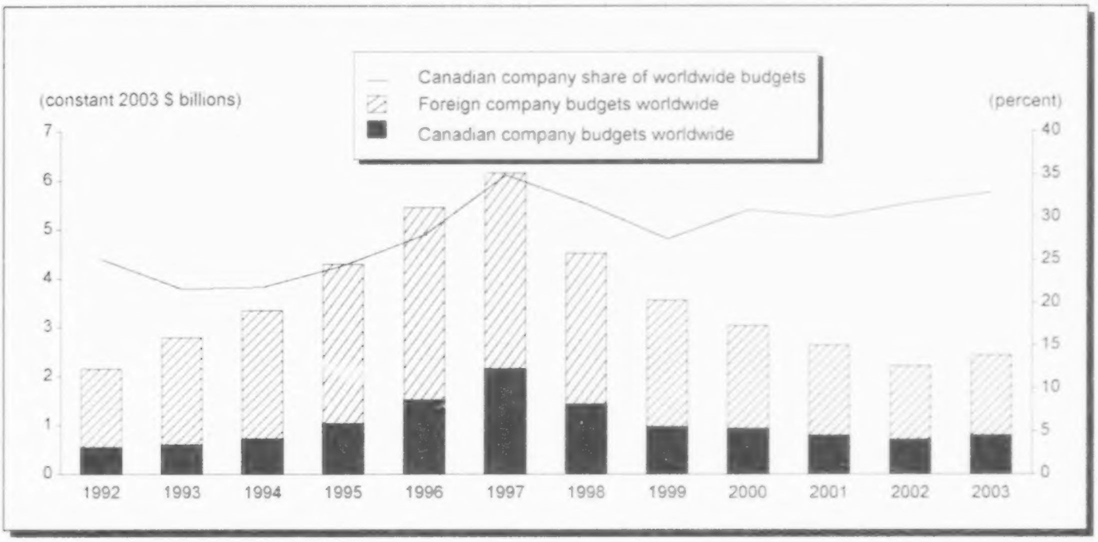
In 2003, the value of the exploration programs that these 41 larger Canadian-based companies planned to undertake in Canada and elsewhere around the world increased to almost $798 million (**Figure 37**), up by $102 million, or 15%, from $696 million budgeted in 2002. Almost 45% of the increase in the exploration budgets of the larger Canadian-based companies from 2002 to 2003 was expected to be spent in Canada and the remaining 55% was expected to be spent abroad.

The programs that the larger Canadian-based companies planned to undertake during 2003 represent one-third of all larger-company exploration programs for the entire world, slightly more than in 2002. However, adding the programs of the smaller Canadian-based companies to those of the larger ones increases the proportion of worldwide exploration planned by Canadian-based companies to 40%.

Figure 37

Exploration Budgets of the World's Larger Companies, by Domicile, 1992-2003

Companies With Worldwide Budgets of at Least $4.3 Million in 2003 for Precious-Metal, Base-Metal or Diamond Exploration



Source: Natural Resources Canada, based on *Corporate Exploration Strategies: A Worldwide Analysis*, Metals Economics Group, Halifax, Nova Scotia.

Notes: The worldwide exploration budgets of companies that intended to spend less than $4.3 million (US$3 million) in 2003 are excluded. The worldwide exploration budgets for other commodities such as uranium or industrial minerals are also excluded.

Canadian companies account for the dominant share, by far, of all worldwide mineral exploration activity undertaken by the larger companies. The larger companies based in Africa account for 20% while those based in Europe and in Australia each account for 13% and those based in the United States account for 11%.

The larger Canadian-based companies typically budget less individually for exploration programs than the industry average worldwide. In 2003, the exploration budgets of the larger Canadian-based companies had a mean of $19.5 million and a median of $8.6 million, compared with global averages of $24.2 million and $10.9 million, respectively. The largest Canadian budget in 2003 was $159 million; the world's largest was $203 million.

Although, on a company-by-company basis, there can be a significant variation between budgets and expenditures, aggregate exploration budgets generally provide a reliable estimate of the total amount actually spent in the field worldwide. For example, in the case of the larger Canadian-based companies, expenditures in 1999 were about 7% lower than budgeted, roughly the same departure as observed in 1998.[28]

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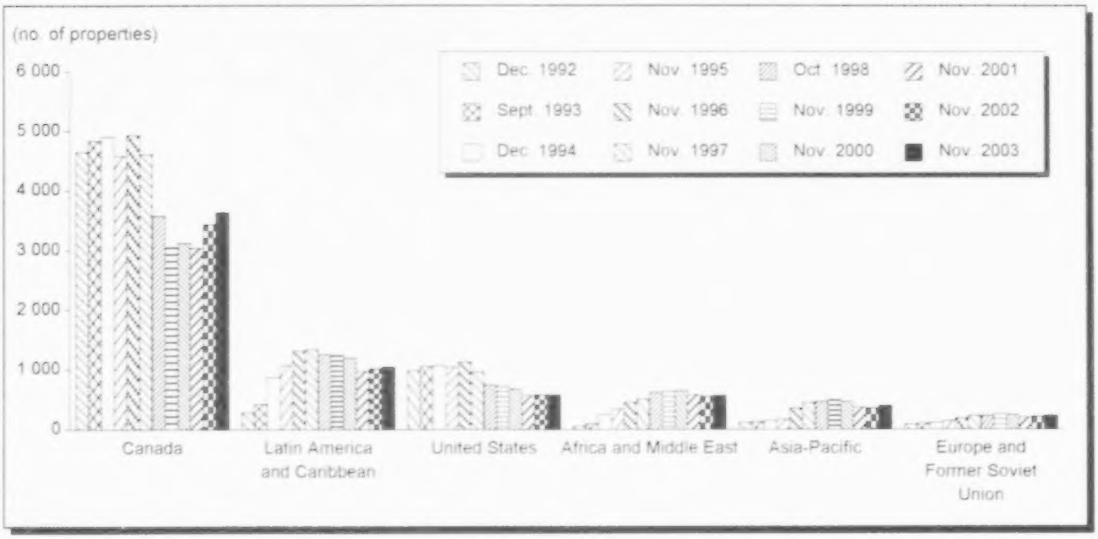
[28] For more information on various aspects of the relationship between exploration budgets and exploration expenditures for the larger Canadian-based companies, see André Lemieux, "Canada's Global Mining Presence," in the 1998 edition of the *Canadian Minerals Yearbook*, Natural Resources Canada, Ottawa, pp. 7.1 and 7.2 (www.nrcan.gc.ca/mms/cmy/content/1998/08.pdf). See also André Lemieux, "Canada's Global Mining Presence," in the 1999 edition of the *Canadian Minerals Yearbook*, Natural Resources Canada, Ottawa, pp. 7.1 and 7.3 (www.nrcan.gc.ca/mms/cmy/content/08.pdf).

Figure 38

Canadian Mineral Property Portfolio Worldwide, by Region, 1992-2003

Companies of All Sizes Listed on Canadian Stock Exchanges



Source: Natural Resources Canada, based on *MIN-MET CANADA* for 1992-97 and InfoMine db for 1998-2003, Robertson Info-Data Inc., Vancouver, British Columbia, and used under licence.

Note: The decrease in properties in Canada after 1997 is due, in part, to the implementation of database features that make it possible to exclude many inactive properties.

At the end of 2003, companies of all sizes listed on Canadian stock exchanges held interests in a portfolio of more than 6400 mineral properties (**Figure 38**) located in Canada or in more than 100 other countries around the world.[29] Most of this portfolio consists of properties at the early stages of exploration. The number of properties that these companies held worldwide at the end of 2003 increased by almost 300, or 5%, compared with the number that they held at the end of the previous year. More than two-thirds of this increase occurred in Canada and reflects, in part, the growing recognition by the global mining industry of the diamond and PGM potential of this country.

3.6 LARGER-COMPANY EXPLORATION MARKET IN CANADA

In 2003, the larger-company mineral exploration market in Canada was valued at $439 million, up by almost $95 million, or 28%, from roughly $344 million in 2002 (**Figure 39**). Only in South Africa were the aggregate exploration programs of the larger companies expected to experience a year-over-year increase of the same magnitude. As in the previous year, Canada, in 2003, remained the country where the global mineral exploration industry is the most active. Australia held that position from 1992 through 2001.

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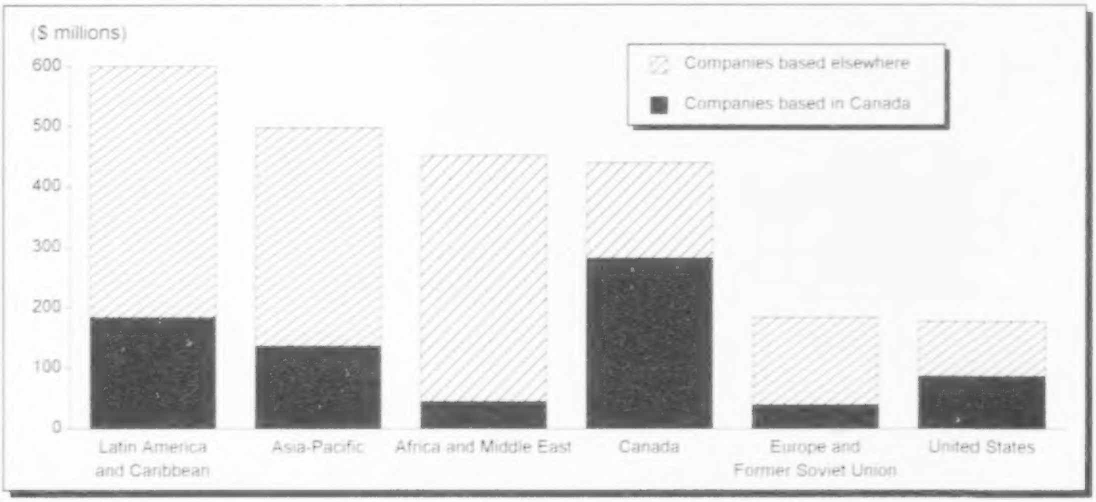
[29] Most of the data for 1991 through 1997 on the mineral property portfolio of companies of all sizes listed on Canadian stock exchanges are derived from MIN-MET CANADA; for 1998 through 2003, the data are derived from InfoMine db. These databases are products of Robertson Info-Data Inc. of Vancouver, British Columbia.

Figure 39

Exploration Budgets of the World's Larger Companies for Selected Regions of the World, 2003

Companies With Worldwide Budgets of at Least $4.3 Million for Precious-Metal, Base Metal or Diamond Exploration



Source: Natural Resources Canada, based on *Corporate Exploration Strategies: A Worldwide Analysis*, Metals Economics Group, Halifax, Nova Scotia.

Notes: The worldwide exploration budgets of companies that intended to spend less than $4.3 million (US$3 million) in 2003 are excluded. The worldwide exploration budgets for other commodities such as uranium or industrial minerals are also excluded.

In 2003, 41 of the world's larger domestic-based or foreign-based companies planned to explore for minerals in Canada, about the same number as in 2002. During 2003, the proportion of all of the world's larger-company exploration programs taking place in Canada returned to the level where it stood prior to the large increase in exploration activity that occurred in developing countries starting in the early 1990s as more than 18% of the exploration efforts of all of the world's larger companies was expected to take place in Canada, up from 16% in 2002 (**Figure 40**). However, adding the exploration programs of the world's smaller companies to those of the larger ones increases the proportion of the world's total exploration activity planned for Canada in 2003 to roughly 22%.

At the end of 2003, there were more than 3600 mineral properties with recent exploration activity in this country[30] (**Figure 38**), about 200 more properties than in 2002.

3.6.1 Larger Canadian-Based Companies in Canada

In 2003, 27 of the larger Canadian-based companies allocated, in total, over $280 million for mineral exploration in Canada (**Figure 39**). Their exploration budgets were up by more than $45 million, or 19%, from the $235 million that they allocated in 2002. For the fourth year in a row, Canadian companies planned to spend more on mineral exploration in Canada than in all of Latin America.

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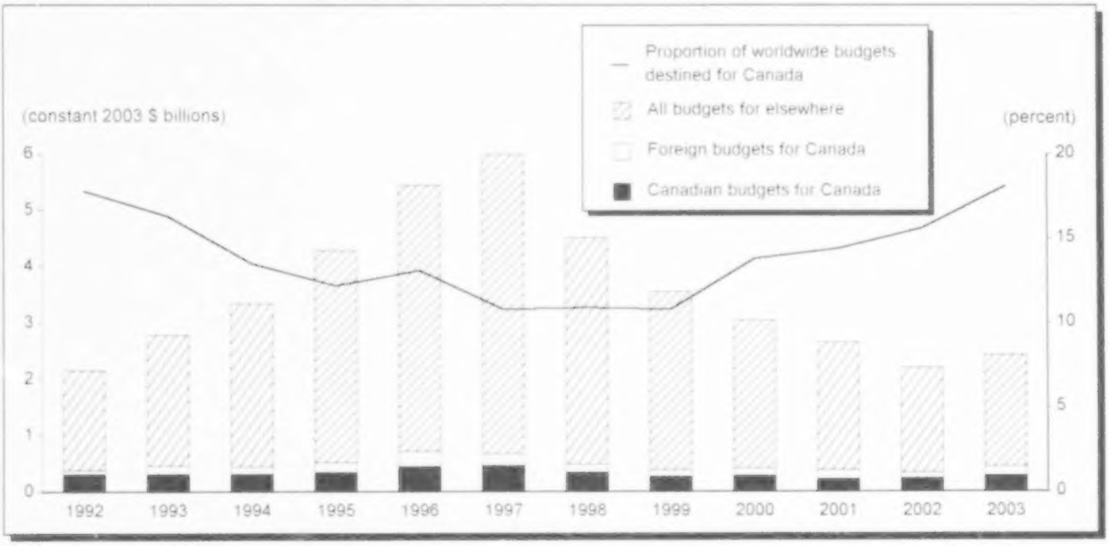
[30] For trends in mineral deposit appraisal activity in Canada over the interval 1982-97, and for a list of projects at the deposit appraisal stage in the late 1990s, see André Lemieux, "Canada's Global Mining Presence," in the 1996 edition of the *Canadian Minerals Yearbook*, Natural Resources Canada, Ottawa, pp. 8.9 and 8.11-8.22 (www.nrcan.gc.ca/mms/cmy/content/1996/08.pdf).

Figure 40

Exploration Budgets of the World's Larger Companies for Canada and Elsewhere, 1992-2003

Companies With Worldwide Budgets of at Least $4.3 Million in 2003 for Precious-Metal, Base-Metal or Diamond Exploration



Source: Natural Resources Canada, based on *Corporate Exploration Strategies: A Worldwide Analysis*, Metals Economics Group, Halifax, Nova Scotia.

Notes: The worldwide exploration budgets of companies that intended to spend less than $4.3 million (US$3 million) in 2003 are excluded. The worldwide exploration budgets for other commodities such as uranium or industrial minerals are also excluded.

With increasing globalization, the share of the domestic exploration market controlled by Canadian-based companies has generally decreased as foreign-based companies have increased the amount of activity that they undertake in this country. In 2003, the larger Canadian-based companies controlled 64% of the larger-company mineral exploration market in Canada, down from 69% in 2002. In 1992, Canadian-based companies controlled 80% of the larger-company mineral exploration market in Canada. In the United States and Australia, the share of the exploration market controlled by the larger domestic firms has also generally fallen since the early 1990s.

Because mineral exploration is such an international enterprise, the dominance of exploration programs by domestic firms is relatively uncommon. In 2003, there were only six countries, other than Canada, where domestic companies controlled more than half of the larger-company market for mineral exploration: Sweden (51%), Australia (52%), Brazil (67%), Russia (68%), South Africa (78%), and Japan (100%). Although, during 2003, the larger-company market for mineral exploration was valued at $159 million in South Africa, at $149 million in Brazil and at $76 million in Russia, it was valued at only $21 million in Sweden and at less than $3 million in Japan.

In 2003, the larger Canadian-based companies allocated 35% of their global exploration budgets to Canada. In 1992, it was 57%. In comparison, in 2003, the larger Australian-based companies allocated half of their global budgets to domestic exploration while U.S. companies allocated 17%. Although Canadian companies operate all over the world, Canada remains the country where they allocate the largest proportion, by far, of their global mineral exploration programs (**Figure 41**).

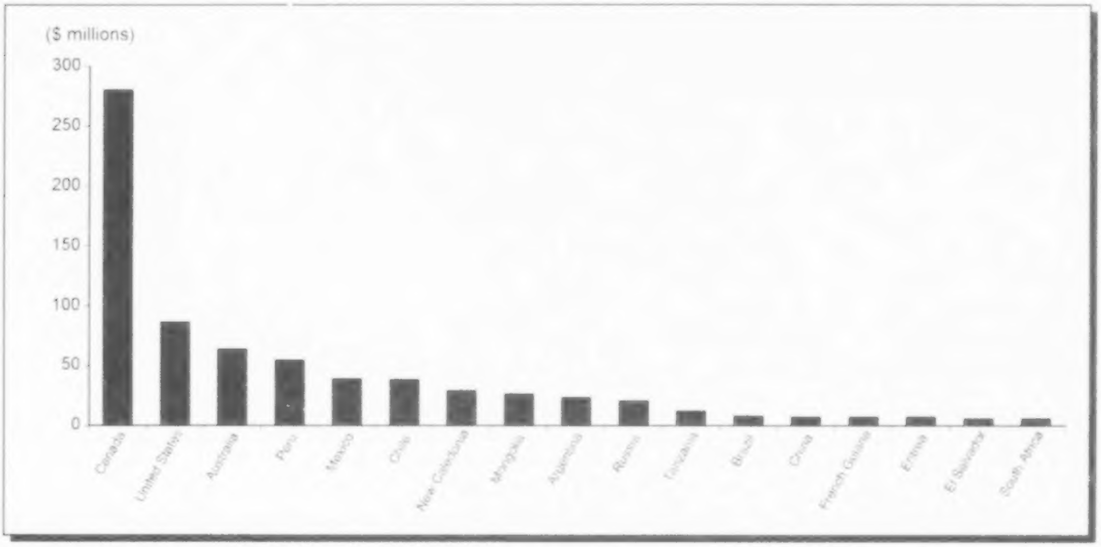
3.6.2 Foreign-Based Companies in Canada

During 2003, 14 of the larger foreign-based companies planned to spend, in total, almost $159 million on mineral exploration in Canada (**Figure 39**), up by $56 million, or 50%, from 2002. The

Figure 41

Exploration Budgets of the Larger Canadian-Based Companies, 2003 – Countries Accounting for 90% of Canadian Budgets

Companies With Worldwide Budgets of at Least $4.3 Million for Precious-Metal, Base-Metal of Diamond Exploration



Source: Natural Resources Canada, based on *Corporate Exploration Strategies: A Worldwide Analysis*, Metals Economics Group, Halifax, Nova Scotia.

Notes: The worldwide exploration budgets of companies that intended to spend less than $4.3 million (US$3 million) in 2003 are excluded. The worldwide exploration budgets for other commodities such as uranium or industrial minerals are also excluded.

mineral exploration programs of the larger foreign-based companies represented more than 36% of all those planned for this country, up from 30% in 2002.

The larger foreign-based companies active in mineral exploration in Canada in 2003 included the BHP-Billiton group and WMC Limited, both based in Australia; Phelps Dodge Corporation, based in the United States; the Anglo American group, Boliden Limited, Lonmin Plc, and Rio Tinto plc, all based in Europe; Anglo American Platinum Corporation Limited, AngloGold Limited, the De Beers group, Gold Fields Limited, and Impala Platinum Holdings Limited (IMPLATS), all based in South Africa; and Companhia Vale do Rio Doce (CVRD) and the Mexican mining consortium, Grupo México S.A. de C.V., both based in Latin America.

3.7 LARGER CANADIAN-BASED COMPANIES ABROAD

In 2003, the larger Canadian-based companies planned to spend almost $518 million on mineral exploration outside of Canada (**Figure 39**). Their foreign budgets were up by $57 million, or roughly 12%, from the more than $460 million that they had planned to spend in 2002.

Almost two-thirds of the worldwide budgets of the larger Canadian-based companies were allocated to programs abroad in 2003, about the same proportion as in the previous year. The foreign programs of the larger Canadian-based companies, as a proportion of their domestic and foreign programs combined, peaked at over 78% in 1997. In 1992 that proportion was 43%.

At the end of 2003, companies of all sizes listed on Canadian stock exchanges held interests in a portfolio of almost 2800 mineral properties located abroad (**Figure 38**), roughly 100 more than at the end of the previous year. Foreign properties represent 43% of the total mineral property portfolio held by companies of all sizes listed on Canadian stock exchanges. In 1992 that proportion was only one quarter. Apart from the United States, where companies of all sizes listed on Canadian stock exchanges have a substantial mining presence, about 30 other nations, spread across the globe, account for much of the balance of their foreign mineral property portfolio (**Figure 42**).

Canadian companies have interests in over 200 mines, smelters, refineries, plants under construction, or other advanced mineral development projects in roughly 60 foreign countries.[31] Canadian companies also have hundreds of other projects at the early stages of exploration in these countries and in more than 40 others.

At the beginning of 2003, there was at least US$54 billion worth of new copper, diamond, gold, iron, nickel, PGM, silver or zinc mining projects, each with a value of at least US$65 million, either at the planning, feasibility, construction or deferred stage of development in Canada or elsewhere around the world.[32] Although only 9% of the total value of those projects was expected to be invested in this country, Canadian companies were expected to participate in roughly 30% of all mining investment planned for Canada and other regions of the globe.

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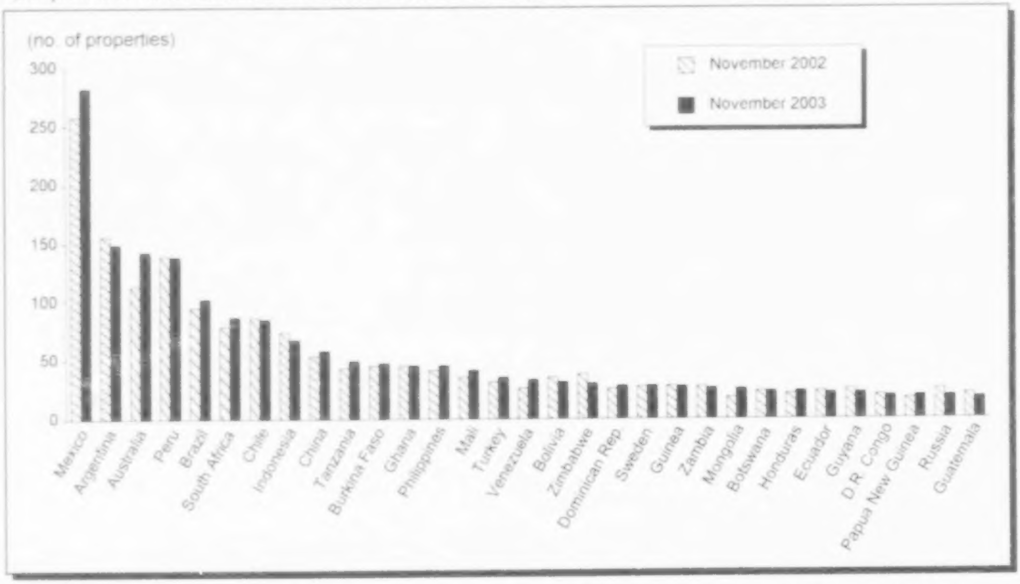
[31] For a list of mines, smelters, refineries and other advanced mineral development projects in which companies based in Canada had an interest in mid-2001, see André Lemieux, "Canada's Global Mining Presence," in the 2000 edition of the *Canadian Minerals Yearbook*, Natural Resources Canada, Ottawa, pp. 7.16-7.19 (www.nrcan.gc.ca/mms/cmy/content/08.pdf).

[32] "Project Investment Survey 2003," *Engineering & Mining Journal*, January 2003, pp. 28-34.

Figure 42

Canadian Mineral Property Portfolio Abroad, 2002 and 2003 – Countries Accounting for 80% of Canadian Holdings Located Outside the United States in 2003

Companies of All Sizes Listed on Canadian Stock Exchanges



Source: Natural Resources Canada, based on InfoMine db, Robertson Info-Data Inc., Vancouver, British Columbia, and used under licence.

The activities of Canadian mining companies in Canada and abroad have fostered the development, in this country, of over 2200 suppliers of specialized mining goods and services. Many of these suppliers, such as some drilling companies, export their products all over the world.[33]

3.7.1 United States

In 2003, the larger-company mineral exploration market in the United States was valued at $177 million (**Figure 39**), or more than 7% of the $2.4 billion larger-company market worldwide. Larger-company budgets for the United States were up by $13 million compared with those of the previous year. Fourteen of the larger Canadian-based companies planned to spend, in total, almost $87 million in the United States, up from $66 million in 2002.

The share of the larger-company mineral exploration market held by Canadian-based companies in the United States in 2003 rose to 49%, up from 40% the previous year. Since the early 1990s, Canadian companies have increased their share of the exploration market in the United States almost every year. The United States ranks second, after Canada, in terms of countries where Canadian companies are the most active in mineral exploration (**Figure 41**).

During 2003, Canadian companies planned to spend almost twice as much on mineral exploration in the United States as domestic companies. The budgets of U.S. companies for domestic exploration have decreased progressively from over $280 million in 1992 to $44 million in 2003. Although U.S. companies accounted for almost 60% of the value of exploration programs in their country in 1992, their activities represented only 25% in 2003.

In late 2003, companies of all sizes listed on Canadian stock exchanges held interests in about 575 mineral properties in the United States (**Figure 38**), the same number of properties that they held at the end of the previous year. In 2000, Canadian companies had projects located in 22 states, but their efforts were concentrated mainly in the western part of the country in Nevada, Alaska, California, Arizona, Montana, Idaho, Wyoming, Colorado, Washington, Utah and South Dakota in decreasing order.[34] That year, Nevada alone accounted for more than 250 of their mineral properties, or almost 40% of the total Canadian portfolio in the United States.

Although Canadian companies have expanded considerably their activities in Latin America, Africa and Asia since the early 1990s (**Figure 38**), the United States is likely to remain, for the foreseeable future, the foreign country where they hold their largest portfolio of mineral properties. At the end of 2003, the United States accounted for over 20% of all properties held abroad by companies of all sizes listed on Canadian stock exchanges.

3.7.2 Latin America and the Caribbean

In 2003, the larger-company mineral exploration market in Latin America and the Caribbean was valued at $635 million (**Figure 39**), or 26% of the $2.4 billion larger-company market worldwide. The larger Canadian-based companies planned to spend $183 million in the region, slightly more than in 2002.

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[33] For a discussion of the global market for mining goods and services, and the role played by Canadian companies, see André Lemieux, *Canadian Suppliers of Mining Goods and Services: Links Between Canadian Mining Companies and Selected Sectors of the Canadian Economy*, Natural Resources Canada, Ottawa, September 2000, 84 pp. (www.nrcan.gc.ca/mms/pubs/services-mines-e.pdf).

[34] For the geographic distribution, by state, of mineral properties in which Canadian companies have an interest in the United States, see André Lemieux, "Canada's Global Mining Presence," in the 2000 edition of the *Canadian Minerals Yearbook*, Natural Resources Canada, Ottawa, pp. 7.5-7.7 (www.nrcan.gc.ca/mms/cmy/content/08.pdf).

After Canada, Latin America and the Caribbean is the region of the world where Canadian companies are the most active in mineral exploration. However, from 1995 to 1999, Canadian companies spent more on mineral exploration in Latin America and the Caribbean than they did in this country. Over the 12-year period 1991-2002, the global mining industry invested more than US$7.2 billion (current dollars) in mineral exploration in Latin America and the Caribbean. Companies listed on Canadian stock exchanges accounted for one third of that investment.[35]

In 2003, Canadian companies held almost 29% of the larger-company mineral exploration market in Latin America and the Caribbean. The value of Canadian exploration programs in that region of the world stood a close second only to that of companies based there. These domestic companies planned to spend $205 million. The share of the exploration market held by local companies stood at 32% in 2003; in 1994, local companies held less than 14% of the market in the region, but their share has generally been rising each year since then.

At the end of 2003, companies of all sizes listed on Canadian stock exchanges held interests in more than 1000 mineral properties in Latin America and the Caribbean, roughly the same number as in 2002. Since 1996, the number of mineral properties held by Canadian companies in the region has exceeded the number held in the United States (**Figure 38**).

3.7.2.1 Mexico

In 2003, the larger-company mineral exploration market in Mexico was valued at $89 million, or roughly 4% of the $2.4 billion larger-company market worldwide. Larger-company budgets for Mexico were roughly $20 million more than those of the previous year.

Mexico is one of the relatively few countries where domestic companies carry out a significant proportion of mineral exploration programs, even if it is not the dominant share. Together the Mexican companies Industrias Peñoles, S.A. de C.V. and Grupo México were expected to undertake almost 30% of the exploration programs planned for that country during 2003.

Mexico ranks second in Latin America, and fifth in the world, in terms of countries where Canadian companies are the most active in mineral exploration (**Figure 41**). Seven of the larger Canadian-based companies planned exploration programs in Mexico in 2003. These companies were expected to spend, in total, $39 million. This represents more than 44%, and the dominant share, of the larger-company market in that country.

At the end of 2003, companies of all sizes listed on Canadian stock exchanges held interests in almost 280 mineral properties in Mexico, about 20 more than at the end of 2002.[36]

3.7.2.2 South America

In 2003, the larger-company mineral exploration market in South America was valued at $496 million, or more than 20% of the $2.4 billion larger-company market worldwide.

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[35] André Lemieux, *Attracting International Mineral Exploration: The Competitive Position of Peru*, unpublished paper, Natural Resources Canada, Ottawa, March 2002, 37 pp.

[36] For the geographic distribution, by state, of mineral properties in which Canadian companies have an interest in Mexico, see André Lemieux, "Canada's Global Mining Presence," in the 2000 edition of the *Canadian Minerals Yearbook*, Natural Resources Canada, Ottawa, pp. 7.7 and 7.8 (www.nrcan.gc.ca/mms/cmy/content/08.pdf).

Fourteen of the larger Canadian-based companies planned to spend, in total, $136 million in the region, about $20 million less than in the previous year. Their programs accounted for 27% of all larger-company mineral exploration activity planned for South America.

Canadian companies held the dominant share of the mineral exploration market in Argentina, Chile, French Guiana and Guyana. Chile and Argentina rank sixth and ninth, respectively, in terms of countries where Canadian companies are the most active in mineral exploration (**Figure 41**).

At the end of 2003, companies of all sizes listed on Canadian stock exchanges held interests in 630 mineral properties throughout South America, the same number as at the end of the previous year. They held almost 150 properties in Argentina, almost 140 in Peru, more than 100 in Brazil, 85 in Chile, about 30 in each of Bolivia and Venezuela, and more than 20 in each of Ecuador and Guyana.

3.7.2.3 Central America

In 2003, the larger-company mineral exploration market in Central America was valued at $11 million, or less than 1% of the $2.4 billion larger-company market worldwide. The larger Canadian-based companies planned to spend $6 million in the region, all of it in El Salvador.

Central America is one of the regions of the world where the smaller companies (**Table 24**), and those based in Canada in particular, account for a substantial amount of the mineral exploration activity that usually takes place. In 2003, the smaller Canadian-based companies were expected to account for all of the $10 million smaller-company exploration market in the region.

At the end of 2003, companies of all sizes listed on Canadian stock exchanges held interests in roughly 90 mineral properties throughout Central America. They held 15 or more in each of El Salvador, Guatemala, Honduras and Panama.

3.7.2.4 Caribbean

In 2003, the larger-company mineral exploration market in the Caribbean was valued at $3 million, or less than 1% of the $2.4 billion larger-company market worldwide. None of the larger Canadian-based companies reported exploration programs for the Caribbean for 2003.

However, as is the case in Central America, the smaller Canadian-based companies were expected to dominate mineral exploration in the Caribbean during 2003. These companies were expected to undertake all of the $2 million worth of smaller-company programs planned for the region.

At the end of 2003, companies of all sizes listed on Canadian stock exchanges held interests in roughly 40 mineral properties in the Caribbean, about 30 of them in the Dominican Republic and about 10 in Cuba.

3.7.3 Europe and the Former Soviet Union

In 2003, the larger-company mineral exploration market in Europe and the former Soviet Union was valued at $183 million (**Figure 39**), or roughly 8% of the $2.4 billion larger-company market worldwide. The larger Canadian-based companies planned to spend $39 million in the region, roughly the same amount as in 2002. The larger Canadian-based companies held 21% of the market in the region.

At the end of 2003, companies of all sizes listed on Canadian stock exchanges held roughly 220 mineral properties in Europe and the FSU (**Figure 38**).

3.7.3.1 Western Europe

In 2003, the larger-company mineral exploration market in western Europe was valued at $69 million, or roughly 3% of the $2.4 billion larger-company market worldwide. The larger Canadian-based companies planned to spend $6 million in western Europe, equivalent to 8% of the market. Canadians were expected to carry out all of the larger-company exploration programs planned for Greenland and Norway.

At the end of 2003, companies of all sizes listed on Canadian stock exchanges held interests in more than 110 mineral properties in western Europe, about 20 more than at the end of the previous year. They held roughly 30 in Sweden, and 15 or more in each of Finland, Greenland and Spain.

3.7.3.2 Eastern Europe

In 2003, the larger-company mineral exploration market in eastern Europe was valued at $16 million, or roughly 1% of the $2.4 billion larger-company market worldwide. The larger Canadian-based companies planned to spend $4 million in eastern Europe, equivalent to one- quarter of the market.

At the end of 2003, companies of all sizes listed on Canadian stock exchanges held interests in 60 mineral properties in eastern Europe. They held more than 35 in Turkey and roughly 10 in each of Greece and Romania.

3.7.3.3 Former Soviet Union

In 2003, the larger-company mineral exploration market in the countries of the FSU was valued at more than $85 million,[37] or roughly 4% of the $2.4 billion larger-company market worldwide. The larger Canadian-based companies planned to spend $25 million in the FSU.

Russia is the only country of the FSU where the larger Canadian-based companies reported exploration programs for 2003. They were expected to spend $20 million there, all of it in the federal district of Siberia and in the federal district of the Russian Far East. Canadian programs for Russia were equivalent to 27% of the market in that country.

At the end of 2003, companies of all sizes listed on Canadian stock exchanges held interests in 45 mineral properties in six countries of the FSU. The number of properties held in Russia stood at roughly 20.

3.7.4 Africa and the Middle East

In 2003, the larger-company mineral exploration market in Africa and the Middle East was valued at $451 million (**Figure 39**), or roughly 19% of the $2.4 billion larger-company market worldwide. The market in that region grew by more than $100 million from 2002 to 2003, or by over 30%. Africa accounts for almost all of the mineral exploration market in the region.

3.7.4.1 Africa

In 2003, the larger-company mineral exploration market in Africa was valued at $448 million, or more than 18% of the $2.4 billion larger-company market worldwide. The larger Canadian-based companies planned to spend more than $43 million in Africa, equivalent to roughly 10% of the market on that continent.

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[37] The size of the mineral exploration market in certain regions of the world is under-estimated because there are few data available on the extent of exploration programs undertaken by some private enterprises and state agencies.

At the end of 2003, companies of all sizes listed on Canadian stock exchanges held interests in almost 550 mineral properties located in 36 countries on the African continent, about 20 more properties than at the end of the previous year. Canadian companies held interests in almost 90 properties in South Africa, almost 50 in Tanzania, more than 40 in each of Burkina Faso, Ghana and Mali, and more than 20 in each of Botswana, Guinea and Zambia.

3.7.4.2 Middle East

In 2003, the larger-company mineral exploration market in the Middle East was valued at $3 million. None of the larger Canadian-based companies planned exploration programs in the region.

3.7.5 Asia-Pacific

In 2003, the larger-company mineral exploration market in Asia-Pacific was valued at $497 million (**Figure 39**), or more than 20% of the $2.4 billion larger-company market worldwide. The value of exploration programs planned for the region in 2003 was about $12 million less than in 2002. The larger Canadian-based companies planned to spend $137 million in the region, equivalent to almost 28% of the market.

At the end of 2003, companies of all sizes listed on Canadian stock exchanges held interests in roughly 390 mineral properties in Asia-Pacific (**Figure 38**), about 35 more than they held at the end of the previous year.

3.7.5.1 Southeast Asia

In 2003, the larger-company mineral exploration market in Southeast Asia was valued at $72 million, or 3% of the $2.4 billion larger-company market worldwide.

The larger Canadian-based companies planned to spend $8 million in the region, equivalent to 11% of the market there. Canadian budgets for individual countries were relatively small, and no single company planned to spend much more than $3 million in any given country.

At the end of 2003, companies of all sizes listed on Canadian stock exchanges held interests in roughly 145 mineral properties in Southeast Asia, about the same as in the previous year. They held about 70 properties in Indonesia and more than 40 in the Philippines.

3.7.5.2 East Asia

In 2003, the larger-company mineral exploration market in east Asia, which includes China, Japan, Mongolia and South Korea, was valued at $52 million,[38] or 2% of the $2.4 billion larger-company market worldwide. The larger Canadian-based companies planned to spend $36 million in the region, equivalent to 70% of the market. From 2002 to 2003, Canadian companies increased the amount of exploration that they planned to conduct in East Asia by 50%.

Since the early 1990s, there has been considerable interest in the mineral potential of China and in the significant growth in demand expected to occur there for many mineral commodities. In 2003, the potential of China became an even greater impetus for mining companies, especially those based in Canada. About half of the companies of all sizes that planned to explore in China in 2003 were based in this country.

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[38] The size of the mineral exploration market in certain regions of the world is under-estimated because there are few data available on the extent of exploration programs undertaken by some private enterprises and state agencies.

3.7.5.3 South Pacific

In 2003, the larger-company mineral exploration market in the South Pacific was valued at $352 million, or more than 14% of the $2.4 billion larger-company market worldwide.

The larger Canadian-based companies planned to spend $93 million in the South Pacific, equivalent to 26% of the market in the region. Australia and New Caledonia rank third and seventh, respectively, in terms of countries where the larger Canadian-based companies are the most active in mineral exploration (**Figure 41**).

At the end of 2003, companies of all sizes listed on Canadian stock exchanges held interests in almost 160 properties in the South Pacific, about 30 more than at the end of the previous year. Roughly 90% of the Canadian properties in the region are located in Australia.

3.7.5.4 South Asia

In 2003, the larger-company mineral exploration market in South Asia, which includes India, Pakistan and Sri Lanka, was valued at $21 million, or almost 1% of the $2.4 billion larger-company market worldwide. The larger Canadian-based companies reported no exploration programs for that region of the world.

3.8 SUMMARY AND OUTLOOK

Over 60% of the world's mining companies are based in Canada. In 2003, roughly 45% of the $12.7 billion in equity capital raised around the world was for the mineral exploration and development projects of companies listed on Canadian stock exchanges.

At the end of 2003, Canadian companies held a portfolio of more than 6400 mineral properties located in Canada and in 100 other countries. These properties were distributed roughly equally between Canada and abroad.

In 2003, the larger Canadian-based companies planned to undertake mineral exploration programs valued at almost $800 million in Canada and elsewhere around the world, roughly $100 million more (in constant dollars) than in 2002. They planned to spend about half of the increase in their budgets on programs in Canada. Canadians programs were equivalent to 33%, the biggest share by far, of the $2.4 billion in exploration programs planned by all of the world's larger companies; the South African share was 20%, the Australian and the European shares were 13% each, the American share was 11%, and the Latin American share was 9%.

As in 2002, Canada, in 2003, remained the country where the world's mineral exploration companies are the most active. Some 18% of the mineral exploration programs planned by all of the world's larger companies was expected to be conducted in Canada, up from 16% in 2002. The larger Canadian-based companies were expected to undertake more than 60% of all the larger-company exploration programs planned for this country.

During 2003, and for the fourth year in a row, the exploration programs of Canadian companies for this country were larger than those they planned to undertake in all of Latin America. The larger Canadian-based companies were expected to carry out the dominant share of exploration programs not only in this country, but also in the United States, Mexico, Central America and East Asia. In all of Latin America and in all of Asia-Pacific, the value of the programs that the larger Canadian-based companies planned to undertake was a close second only to that of companies based in those regions.

In 2003, the larger Canadian-based companies allocated one-third of their mineral exploration budgets to programs in Canada and the remaining two-thirds to programs abroad. Even though Canadians have diversified their portfolio of mining assets to well over 100 countries, Canada remains the country where they continue to be, by far, the most active in mineral exploration.

The larger-company exploration market is becoming increasingly concentrated. The number of companies spending the equivalent of US$3 million per year on exploration (C$4.3 million in 2003) has decreased significantly since the late 1990s. There were 41 such Canadian-based companies in 2003. In 1997, there were 141, an all-time record number.

Transnational mergers and acquisitions have become a frequent occurrence in the mining industry. As a result, the industry is becoming increasingly more globalized in its operations. Although Canadian companies still control the dominant share of the mineral exploration market in Canada, the share of the Canadian market controlled by the larger foreign-based companies has grown from 20% in 1992 to roughly 38% in 2003.

Even though the focus here is on the exploration activities of the world's larger companies, the smaller companies are an important and essential component of mineral exploration and development in many regions of the world, but especially in Australia and Canada. In the case of Canada, in 2003, the inclusion of the budgets of the smaller companies with those of the larger ones raises the proportion of all global exploration programs planned by Canadian-based companies from one-third to 40% of the world total; it also raises the proportion of all of the world's mineral exploration programs planned for Canada from 18% to 22%.

Although Canadian companies tend, on average, to have smaller exploration budgets than their competitors, they are considerably more numerous than companies based elsewhere. As a result, Canadian companies are likely to continue, for the near future at least, to dominate mineral exploration worldwide.

APPENDIX 1

Historical Exploration and Deposit Appraisal Statistics

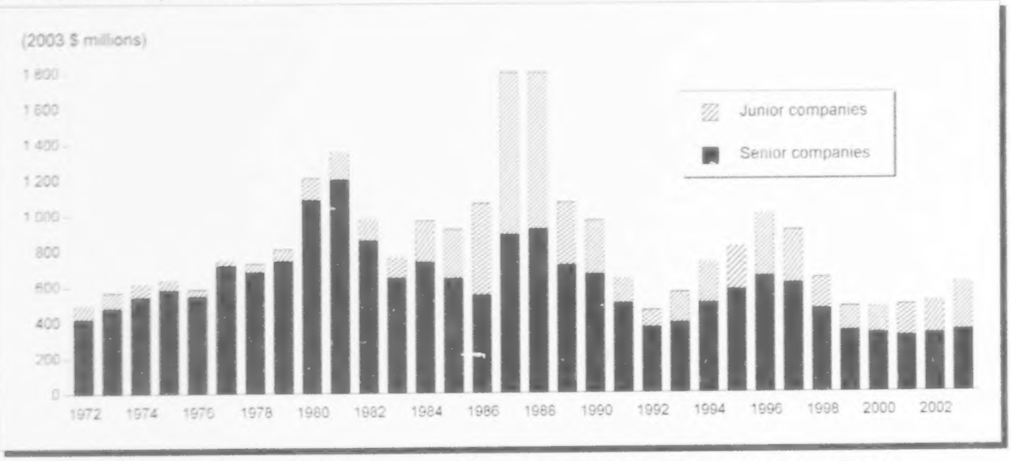
INTRODUCTION

Appendix 1 contains data and analyses that are based on the pre-1997 survey definitions when only field and overhead costs were considered. While more restricted by this measure of exploration and deposit appraisal activity, the data are available over a much longer time period. The resulting time series provides a useful statistical tool for studying historical trends in Canadian mineral exploration spending.

HISTORICAL SUMMARY

Figure 43 depicts Canadian exploration and deposit appraisal expenditures (field and overhead costs only) in constant 2003 dollars over the period 1972 to 2003. Above-normal expenditures in the 1980-82 period resulted from high prices for gold, silver and copper over much of that period.

Figure 43
Exploration and Deposit Appraisal Expenditures (1) **(Field Work and Overhead) in Canada by Junior and Senior Companies, 1972-2003** (2003 Dollars)



Source: Natural Resources Canada, based on the Survey of Mineral Exploration, Deposit Appraisal and Mine Complex Development Expenditures.
(1) Includes on-mine-site and off-mine-site activities.
Notes: Total expenditures for 1975-81 are overstated by an average of about 17% relative to earlier and later years because of changes to the methodology used by Statistics Canada over the years. Data for 2003 are final. Expenditures for 1997 to 2003 include both exploration and deposit appraisal costs as per the new survey definitions; up to and including 1996, most of the expenditures now included in the deposit appraisal phase were reported under "exploration," broadly speaking.

Spending declined somewhat in 1983, but generally rose from 1984 to 1988 as a result of the introduction by the federal government, in 1983, of the Mining Exploration Depletion Allowance (MEDA). MEDA was replaced in 1989 and 1990 by the Canadian Exploration Incentive Program (CEIP). By 1987 and 1988, expenditures had reached unprecedented high levels because of MEDA and the high gold prices that had prevailed until the end of 1987. However, spending fell dramatically after 1988 and decreased until 1992 when it reached its lowest inflation-adjusted level since 1966.

Activity picked up gradually in the 1993-96 period. Expenditures increased by 118% from 1992 to 1996 and the 1996 level of $1007 million (2003 dollars) was the highest since 1989. Although exploration and deposit appraisal spending declined to $912 million (2003 dollars) in 1997, it still remained relatively strong by historical standards. However, spending dropped significantly in 1998 to $643 million (2003 dollars), a decline of 30% from 1997. At $481 million, the 1999 total represents a further drop of 25% from the 1998 level and represented the second lowest total in almost the past four decades. The recovery began almost imperceptibly in 2000 when field and overhead spending increased by $2 million and gathered a little momentum in 2001 with a further gain of $7 million to reach $490 million. Data on field and overhead spending for 2002 and 2003 show a continued strengthening of field and overhead expenditures with spending totals of $513 million and $614 million, respectively.

Returning to 1992, the relatively higher expenditure levels that were recorded in ensuing years resulted, to a great extent, from important discoveries of diamond deposits. These discoveries led companies to invest vast sums of money in advanced exploration or deposit appraisal projects and in mine development activities. As indicated in Chapter 1 of this report, over $1.8 billion (constant 2003 dollars) has been spent on the search (exploration and deposit appraisal only) for diamonds since 1993.

Another major contributor was the late-1994 nickel-copper-cobalt discovery at Voisey's Bay, Labrador, a result of exploration for diamonds in that area, which attracted a lot of attention, especially from junior exploration companies. The resulting flurry of exploration and deposit appraisal activity in the area also had a strong impact on expenditures, particularly in 1995 and 1996.

A combination of factors took over after 1997 to bring Canadian mineral exploration and deposit appraisal activity to dangerously low levels where both the resilience of the Canadian junior mining sector and the ore-reserve sustainability of a number of mineral producers were tested. Metal prices, as explained below, constituted the primary factor. Generally low demand for metals was exacerbated by worldwide economic events, including the Asian financial crisis and the September 2001 terrorist attacks in the United States, and companies, especially juniors, had plenty of difficulty in raising exploration funds in the wake of corporate scandals like the Bre-X affair.

In this generally negative context, the introduction by the federal government and by some provincial/territorial governments of exploration tax credits and other measures was welcome news and contributed, along with a rapidly improving metals price outlook and continued success in the search for diamonds, to the recovery that began so timidly in 2000, that was confirmed in 2003, and that really exploded into a banner year in 2004.

METAL PRICES AND EXPLORATION AND DEPOSIT APPRAISAL LEVELS

Under normal circumstances, metal prices are probably the most important factor influencing the level of exploration and deposit appraisal activity. For example, between 1993 and 1995, copper, nickel and lead prices increased by over 60% while zinc and gold prices increased by 14%. Over the same period, field and overhead exploration and deposit appraisal spending (excluding diamonds-related spending and in current dollars) increased by almost 50%.

In early 1995, metal prices embarked on a downward trend as reflected by Natural Resources Canada's monthly Metals Price Index (**Figure 44**). After peaking in January 1995, the index began a generally decreasing trend and had fallen by 39% by January 1999, when it reached its lowest level since at least January 1989. The index generally increased from January 1999 to March 2000 when it stood about 35% above the level of January 1999. It then began a downward trend and, in October 2001, following the September 2001 terrorist attacks in the United States and amid generally low metal prices, the index dropped to a new low. The recovery that began afterwards picked up considerable steam in the second half of 2003 and continued towards new heights in 2004, although at a slower growth rate than in 2003 and with more volatility. At the end of 2004, the NRCan monthly Metals Price Index stood at levels not seen since the late 1980s with the respective prices of all of its six individual metals showing strength. In fact, the December 2004 monthly average prices of copper, nickel and gold were at 15-year highs.

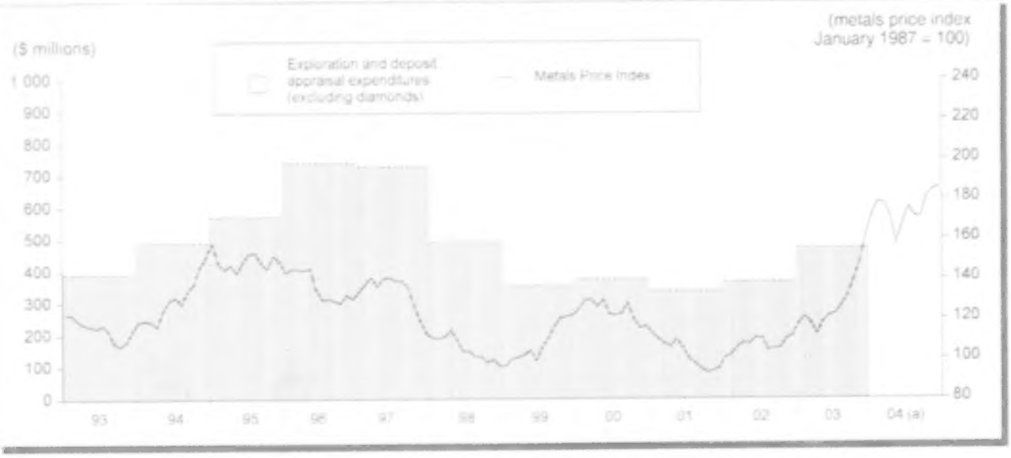
As outlined in Chapter 1, there is a relationship between the level of spending in a particular year and metal prices in earlier years. The decreasing trend in metal prices that began in 1995 was not reflected in spending levels before 1997, partly because of that relationship and partly because of the expenditures on the search for diamonds, which added an element of stability to exploration and deposit appraisal levels. When excluding diamonds, expenditures (field and overhead costs only) peaked in 1996, started declining in 1997, fell even more in 1998 and 1999, were mostly stable but low in the 2000-2002 period, and began a significant recovery in 2003. (While the 2004 total for this type of spending has not yet been compiled, it is highly probable that the 2004 total will be even better than the level achieved in 2003.) This relationship outlines the importance of improving metal prices in enticing higher exploration and deposit appraisal spending levels and, based on the current strength in metals prices, provides for a positive short-term outlook.

EXPLORATION AND DEPOSIT APPRAISAL EXPENDITURES BY JUNIOR COMPANIES

As shown in **Figure 43**, junior companies have traditionally played an important role in Canadian mineral exploration and deposit appraisal activity. However, their contribution really expanded in

Figure 44

Exploration and Deposit Appraisal Expenditures (Field Work and Overhead) in Canada, and Natural Resources Canada's Monthly Metals Price Index, 1993-2004 (Current Dollars)



Source: Natural Resources Canada, based on the Survey of Mineral Exploration, Deposit Appraisal and Mine Complex Development Expenditures.

(a) At press time, no data were available for field and overhead costs in 2004.

Notes: Exploration and deposit appraisal data up to 2003 are final. For comparison with pre-1997 years, the data include only field and overhead expenditures.

1984, a year after the introduction of MEDA, when their spending accounted for almost 24% of total exploration and deposit appraisal expenditures. That proportion had more than doubled by 1987 when junior companies accounted for $943 million (2003 dollars), or 51% of the total of $1.83 billion spent during that year. Junior spending was also very important in 1988 with almost 50% ($902 million) of total expenditures. Their proportion of total spending then started to gradually decrease until it reached 21% in 1992.

The levels of spending recorded by junior companies in the 1986-88 period are even more impressive when taking into account the fact that, during that period, considerable contributions were made by junior companies to joint-venture projects operated by senior companies. In the survey, these contributions were counted as part of senior companies' spending, thus overstating senior expenditures and understating junior expenditures.

On a yearly basis, junior spending accounted for approximately 30% of total expenditures (field work and overhead only) over the period 1993-2000. The discovery of diamonds in Canada's North and of nickel-copper-cobalt at Voisey's Bay were the two most important positive factors affecting junior spending during those years. Low metal prices, a slowing world economy and difficulties in raising financing explain the more difficult years. The introduction of the federal Investment Tax Credit for Exploration (ITCE) in October 2000 and related provincial tax credits, around that time and subsequently, appear to have been favourable to junior mining companies as their expenditures started to recover faster than those of senior companies. This recovery in junior spending has been strong enough to increase their share of total spending (field and overhead costs) to almost 44% in 2003. The current metal price outlook, the momentum generated in 2003, and especially in 2004, and the eagerness of financial markets to fund mineral exploration activities should help junior companies maintain a healthy share of total Canadian exploration and deposit appraisal spending in the coming years.

EXPLORATION AND DEPOSIT APPRAISAL EXPENDITURES BY PROVINCE AND TERRITORY

Tables 25 and **26** show exploration and deposit appraisal expenditures (field and overhead costs only) by province and territory in terms of current dollars and 2003 constant dollars. Both tables cover the period 1989 to 2003, which includes the period when MEDA was replaced by CEIP, the difficult period that led to the trough of 1992, the exciting discoveries of 1993 and 1994 and the ensuing increase in spending up to 1996, the downward trend that has brought exploration and deposit appraisal spending down to an almost historical low in 1999, and the latest upward trend that began in 2000 and accelerated in 2003.

TABLE 25. EXPLORATION AND DEPOSIT APPRAISAL EXPENDITURES (FIELD WORK AND OVERHEAD) IN CANADA, BY PROVINCE AND TERRITORY, 1990-2003 (CURRENT DOLLARS)

	Total Exploration and Deposit Appraisal (1)													
Province/Territory	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
							($ millions)							
Newfoundland and Labrador	23.3	12.1	11.1	8.9	12.4	71.1	92.5	58.4	40.8	29.3	23.1	20.7	24.0	21.5
Nova Scotia	11.0	4.5	3.3	1.8	1.7	2.8	6.9	6.7	4.8	3.6	3.0	1.5	1.8	4.0
New Brunswick	16.5	15.8	12.2	11.1	10.0	12.7	14.8	12.2	10.0	10.0	12.0	9.4	3.2	2.5
Québec	196.4	138.1	94.1	106.1	130.3	123.4	137.2	168.6	123.5	103.4	89.9	94.8	104.0	128.0
Ontario	152.6	109.7	77.4	75.6	113.0	129.7	194.9	176.5	111.3	81.1	113.7	110.2	121.0	187.4
Manitoba	41.2	29.7	32.0	27.4	40.5	32.6	41.2	40.3	29.5	22.6	27.7	28.5	29.6	27.0
Saskatchewan	42.2	31.5	25.9	53.1	50.6	43.8	50.6	49.9	57.8	36.0	40.0	34.4	35.2	43.6
Alberta	10.7	6.6	5.4	7.3	9.4	10.6	10.8	20.5	21.6	11.4	6.1	4.3	5.6	4.6
British Columbia	226.5	135.7	71.6	66.0	85.0	79.4	104.9	95.8	44.3	33.4	29.9	25.6	34.5	52.6
Yukon	18.4	16.5	9.7	19.2	25.7	39.3	46.4	40.6	17.5	12.2	9.9	7.3	7.4	11.9
Northwest Territories	36.0	31.6	42.7	100.7	149.5	172.2	194.5	150.7	114.8	61.0	45.3	75.2	59.8	45.7
Nunavut	. .	. .	. .	. .	. .	. .	. .	. .	. .	33.8	57.4	58.1	71.3	85.3
Total field work (excluding overhead)	660.3	439.2	323.5	410.1	540.5	608.1	835.9	749.5	522.4	387.6	412.3	415.8	434.8	552.7
Total exploration and deposit appraisal (including overhead)	774.7	531.8	385.3	477.3	628.1	717.6	894.8	820.2	575.9	437.9	458.1	470.1	497.2	614.2

Source: Natural Resources Canada, based on the Survey of Mineral Exploration, Deposit Appraisal and Mine Complex Development Expenditures.

. . Not available.

(1) For comparison with pre-1997 years, the data include only field and overhead expenditures. They do not include other related expenditures such as those for engineering, environment and land access.

Notes: Numbers may not add to totals due to rounding. Data are final.

TABLE 26. EXPLORATION AND DEPOSIT APPRAISAL EXPENDITURES (FIELD WORK AND OVERHEAD) IN CANADA, BY PROVINCE AND TERRITORY, 1990-2003 (2003 DOLLARS)

Province/Territory	Total Exploration and Deposit Appraisal (1)													
	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
	(2003 $ millions)													
Newfoundland and Labrador	29.1	14.7	13.4	10.5	14.5	81.4	104.2	65.0	45.5	32.2	24.3	21.5	24.8	21.5
Nova Scotia	13.8	5.5	3.9	2.1	2.0	3.3	7.8	7.5	5.4	4.0	3.1	1.6	1.9	4.0
New Brunswick	20.6	19.2	14.6	13.1	11.7	14.5	16.6	13.5	11.2	11.0	12.7	9.8	3.3	2.5
Québec	245.7	167.6	112.9	125.5	152.4	141.1	154.4	187.5	137.9	113.5	94.7	98.8	107.3	128.0
Ontario	190.9	133.3	92.9	89.4	132.1	148.4	219.4	196.2	124.2	89.1	119.9	114.9	124.8	187.4
Manitoba	51.5	36.1	38.3	32.4	47.4	37.3	46.4	44.8	32.9	24.8	29.2	29.7	30.5	27.0
Saskatchewan	52.8	38.3	31.0	62.9	59.2	50.1	56.9	55.5	64.5	39.5	42.2	35.9	36.3	43.6
Alberta	13.4	8.0	6.5	8.7	11.0	12.1	12.2	22.8	24.1	12.5	6.4	4.4	5.8	4.6
British Columbia	283.3	164.9	85.9	78.1	99.3	90.8	118.0	106.6	49.4	36.6	31.6	26.7	35.6	52.6
Yukon	23.0	20.1	11.6	22.7	30.1	44.9	52.2	45.1	19.6	13.4	10.5	7.6	7.6	11.9
Northwest Territories	45.0	38.4	51.2	119.2	174.8	197.0	219.0	167.6	128.2	66.9	47.8	78.4	61.7	45.7
Nunavut	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Total field work (excluding overhead)	825.9	533.6	388.0	485.2	632.0	695.7	940.8	833.5	583.2	425.5	434.6	433.3	448.5	552.7
Total exploration and deposit appraisal (including overhead)	969.0	646.3	462.2	564.6	734.5	821.0	1 007.0	912.0	643.0	480.6	482.8	489.9	512.9	614.2

Source: Natural Resources Canada, based on the Survey of Mineral Exploration, Deposit Appraisal and Mine Complex Development Expenditures.
n.a. Not applicable.
(1) For comparison with pre-1997 years, the data include only field and overhead expenditures. They do not include other related expenditures such as those for engineering, environment and land access.
Note: Numbers may not add to totals due to rounding. Data are final.

APPENDIX 2

Survey of Mineral Exploration, Deposit Appraisal and Mine Complex Development Expenditures

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HISTORY OF CANADIAN EXPLORATION STATISTICS

In Canada, mineral exploration statistics have been collected, in one form or another, since 1946. From 1946 to 1963, Statistics Canada compiled "cost of prospecting" data for metal mines for Canada and the provinces. Companies were surveyed from 1964 to 1966, but the data were not compiled. However, using the filled-out survey questionnaires for those three years, Natural Resources Canada (NRCan) was able to estimate expenditures for that period. From 1967 to 1987, Statistics Canada compiled and published both mine-site and general exploration expenditures, as well as mine-site development expenditures and other capital and repair expenditures. From 1985 to 1987, NRCan collected detailed field work expenditures. Since 1988, NRCan has been fully responsible for the survey of non-producing entities that have any type of exploration expenses. Statistics Canada continued to survey producing firms until 1997.

A review of survey definitions was carried out in the mid-1990s to improve the quality of the survey. This revision was undertaken by the Federal-Provincial Committee on Mineral Statistics, in consultation with industry, and completed in 1997. The resulting Survey of Mineral Exploration, Deposit Appraisal and Mine Complex Development Expenditures was designed to better describe the full mineral development cycle (**Table 27**) and to provide more comprehensive measures of investment in the Canadian minerals and metals industry. Statistics from this survey include detailed information on feasibility studies and other more technically related costs that were previously excluded. The redesigned survey also provides a clearer distinction between the primary exploration and deposit appraisal phases, and additional information on associated environmental costs. Since 1997, NRCan has been fully responsible for the coordination of the federal-provincial/territorial preliminary and forecast survey, and partially responsible for the annual survey for both non-producing and producing firms.

SURVEY PROCESS

Two questionnaires are distributed each year. For example, for the survey period 2003/04, the *2003 preliminary estimate* and *2004 intentions* survey was conducted during the last quarter of 2003 and compiled in January 2004. The more detailed *final* survey questionnaires for 2003 were distributed in early 2004. The results of this *final* survey were compiled during the course of 2004. A *revised forecast* survey was also conducted during the course of 2004 by contacting the project operators who had reported spending intentions in the *2003 preliminary estimate* and *2004 intentions* survey and those that had failed to do so. The *preliminary estimate* and *intentions* survey usually provides preliminary results on the year in which the survey was conducted and a forecast for the coming year that is based on company spending intentions. The *final* survey provides a wealth of project-specific information, including the types of commodities explored for, the type of field work undertaken, related overhead expenditures, the type of company involved, joint-venture partners, and other details.

TABLE 27. GENERALIZED MODEL OF THE MINERAL RESOURCE DEVELOPMENT AND MINING PROCESS

PHASE	MINERAL RESOURCE ASSESSMENT	MINERAL EXPLORATION					MINERAL DEPOSIT APPRAISAL				MINE COMPLEX DEVELOPMENT	MINE PRODUCTION	ENVIRONMENTAL RESTORATION
		GRASS-ROOTS EXPLORATION											
	MRA	EX-1	EX-2	EX-3	EX-4	EX-5	DA-1	DA-2	DA-3	DA-4	MCD	MP	ER
STAGE	Various surveys, research and synthesis	Exploration planning	Regional reconnaissance and surveys	Prospecting and ground surveys of anomalies	Verification of anomalies and showings	Discovery and delimitation of a mineral deposit	Mineral deposit definition	Project engineering	Project economics	Feasibility study, production decision	Mine development, construction of processing plant and infrastructure	Production, marketing and renewal of reserves	Mine complex closure and decommissioning site restoration
OBJECTIVES	Supply information and tools required to develop the mineral potential of the nation for economic benefit in the perspective of sustainable development	Select target commodities. Establish exploration objectives and strategies. Select target areas and sites. Acquire claims or permits if appropriate	Seek anomalies of interest over wide areas by various survey methods. Select the more promising targets. Acquire claims or permits	Confirm the presence, exact location and characteristics of anomalies. Acquire claims, leases and properties	Investigate the cause of anomalies. Find mineral showings. Acquire additional claims, leases and properties	Discover, delimit and interpret grade, quality and tonnage of a new mineral deposit. Determine if it constitutes a mineral resource of "potential economic interest" to justify more intensive and detailed work	Define the limits, controls and internal distribution of grades, mineralogy and mineral processing characteristics of the deposit. Acquire all data required for project engineering and cost estimation	Determine, in an iterative fashion, the design, plans, schedules, capital cost and operating cost estimates for all aspects of the project. Establish technical feasibility and costs thoroughly and realistically	Obtain all the information required and determine, based on corporate objectives, parameters for the economic, financial and social-political evaluation of the project	Diligently validate and integrate project data, interpretations, estimations, plans and evaluations to achieve MCD and production objectives. Decide on whether to undertake the mining project. Obtain permits and financing	Complete mine development and construction on schedule and within budgets and specifications. Ensure efficient and timely mine complex start up according to schedule, specifications and cash flow forecasts	Achieve commercial production on schedule and meet cash flow forecasts and quantity and quality specifications. Achieve mine profitability and company survival in the perspective of sustainable development	Restore mine site, outside plant and infrastructure to environmentally acceptable condition. Ensure the future quality of the environment
EVALUATION METHODS	Geoscientific, mineral and economic surveys, research, compilations and synthesis by governments, research institutes, universities and industry	Metal and mineral market research. Review of geological and ore deposit information and of the legal, fiscal and socio-political context in various areas	Remote sensing, aerial photography and airborne geophysics. Prospecting, geology and geochemistry. Appraisal, rating and selection of anomalies	Ground, geological, geochemical and geophysical prospecting and surveys. Compilation, appraisal and selection of significant anomalies	Geological mapping and other surveys. Trenching, drilling and sampling. Appraisal of results, recommendations for further work, and selection of new targets	Stripping, trenching, mapping, sampling, drilling and down hole geophysics. Initial mineral processing tests. Environmental and site surveys. Mineral resource estimation and inventory	Detailed mapping, sampling and drilling on surface or from underground. Systematic mineralogy and mineral processing tests. Detailed environmental and site surveys. Pre-feasibility studies	Pilot tests, engineering design and planning. Capital and operating costs for mining, mineral processing, infrastructure, environmental protection and restoration. Technical risk analysis. Pre-feasibility studies	Market, prices, product development and financial studies. Environmental, economic, financial, and socio-political risk analysis. Pre-feasibility studies	Exhaustive due diligence review of all data, interpretations, plans and estimates. Evaluation of profitability, given the geological, technical, financial and qualitative risks, and the up-side factors	Project management methods in a quality assurance perspective. Training program for personnel and detailed start up plan to meet the requirements of this demanding period	Production management methods to ensure continuous quality and efficiency improvements. Exploration, deposit appraisal and development of new zones or deposits on-mine site and off-mine site	Mine closure and decommissioning. Environmental restoration and monitoring
RESULTS	Maps, data bases, tools and models	Exploration projects	Regional anomalies	Local anomalies	Mineral showings	Mineral deposit	Deposit appraisal project			Mining project	Mining complex	Mineral production	Restored site
MINERAL INVENTORY	UNDISCOVERED MINERAL POTENTIAL					INFERRED RESOURCE	DELIMITED MINERAL RESOURCE				MINERAL RESERVE		
	SPECULATIVE			HYPOTHETICAL			INDICATED	INDICATED AND MEASURED			PROVEN AND PROBABLE		
ESTIMATION ERROR (targeted margin of error of tonnage/grade estimates at the 90% confidence level)						± 100%	± 50%	Indicated: ± 50 to ± 20% Measured: ± 20 to ± 10% (often several sample grid dimensions are used in each category)			Proven (feasibility: ± 10%; mining: ± 5%)		
INVESTMENTS	Moderate	Low, but increasing multiple investments					Larger and increasing multiple investments				Very large industrial investment		Full compliance
RISK LEVEL	Low	Very high, but decreasing risk of failure and financial loss					High, but decreasing risk of failure				Moderate to low industrial risk		

Sources: Modified by D.A. Cramsted, A. Lemieux and M. Vallée, February 25, 1994, from M. Vallée, 1992, *Guide to the Evaluation of Gold Deposits*, CIM Special Volume 45, p. 4, and *SOQUEM Annual Report*, 1976-77, pp. 4 and 5. Revised by M. Vallée and G. Bouchard, January 2001.

The questionnaires for the preliminary and forecast survey were distributed in the fall of 2003 and the questionnaires for the final survey were distributed in early 2004. Some companies receive more than one questionnaire depending on the number of provinces/territories in which they are conducting activities. To avoid duplicate reporting, joint-venture participants who are not project operators do not report expenditures on such joint-venture projects. Companies are asked to report expenditures for the calendar year surveyed.

The survey is a full census of all the companies involved in mineral exploration, deposit appraisal and mine complex development in Canada. To protect the confidential data provided by the respondents, only aggregate statistics are released. However, specific information can be added when such information has already entered the public domain.

DEFINITIONS USED IN THE SURVEY

A number of definitions were introduced in the 1997 redesign of the survey to more closely reflect the current realities of Canadian mineral exploration and development activities. These definitions were developed and agreed upon by federal, provincial/territorial and industry representatives, and they were tested by companies that volunteered to ensure their relevance and applicability. The following is a summary of the definitions most referred to in this report. For a more comprehensive list of definitions, along with more complete descriptions, the reader is invited to consult the Reporting Guide for the Survey of Mineral Exploration, Deposit Appraisal and Mine Complex Expenditures. This guide is available from Natural Resources Canada or from provincial/territorial survey partners.

Mineral Development Phases (Work Phases)

Exploration expenditures represent all field activities, including capital, repair and maintenance expenditures, carried out (on- or off-mine-site) to search for, discover and carry out the first delineation of a previously unknown mineral deposit to establish its potential economic value (tonnage and grade) and to justify further work.

Deposit appraisal expenditures represent all field activities, as well as capital, repair and maintenance expenditures, carried out (on- or off-mine-site) to bring a delineated deposit to the stage of detailed knowledge required for a feasibility study to justify and support a production decision and the investment required.

Mine complex development expenditures include all mine development, capital (construction, machinery and equipment), repair and maintenance expenditures carried out on a mine property that is in production or committed to production.

Mine development expenditures include all activities carried out on a property that is in production or committed to production to define, block out, and gain access to the ore and prepare it for production. Mine development also includes drilling, rock work and support to extend the current ore reserves.

Location of Activity

On-mine-site expenditures represent all field activities and capital, repair and maintenance expenditures applied to exploration or deposit appraisal for an additional mineral deposit separate from the current mine reserves and located strictly on an existing mine site in production or committed to production.

Off-mine-site expenditures represent all field activities and capital, repair and maintenance expenditures applied to exploration or deposit appraisal that are not located on a mine site that is in production or committed to production. Off-mine-site includes the sites of temporarily or permanently closed mines and advanced projects not yet committed to production.

A *mine site* is an area than can be accessed and exploited from the current or committed installations; hence, the size of this area will vary depending on the commodity under consideration, attitude (horizontal vs. vertical), type and extent of the deposit(s), and the mining method(s) in use.

For a mine site to be *committed to production*, all of the following criteria must be met: (i) a production feasibility study has been completed; (ii) a formal production decision has been reached by the organization; (iii) the necessary financing is on hand or has been arranged; (iv) all required authorizations and permits have been obtained; and (v) major pieces of production equipment have been purchased or ordered.

Surface and Underground Field Surveys and Work (Includes Field Overhead)

Surface and underground field surveys and work includes expenditures associated with geoscientific surveys, drilling, rock work, other field costs, and engineering, economic and feasibility studies. It includes wages, salaries, fringe benefits, food, accommodation and other services, equipment rentals, all vehicle expenses, transportation costs (for people and equipment), and all related technical activities/services such as planning, data collection, interpretation, mapping and reports. The costs incurred by the project operator and contractor(s), as well as field supervision and management costs, are also included. All surveys and work done for environmental purposes are entered under the environment section. This would apply, for example, to geochemical or geophysical surveys performed to characterize or monitor the environment.

Engineering studies include all expenditures related to the additional studies, tests and pilot work (mining, mineral processing, metallurgy, dewatering, etc.), plans, designs and appraisals required to establish the technical feasibility of a mining project.

Economic studies include all expenditures for economic studies (markets, product development, price studies, financing, etc.) required to establish the economic feasibility of a mining project.

Feasibility studies include all expenditures related to prefeasibility project reviews and to the production of feasibility studies required to develop and mine a deposit, and to obtain the required leases, permits and authorizations (excluding environmental and land access expenditures).

Environment-Related Expenditures

Environmental characterization includes all costs of environmental characterization and assessment (including environmental impact studies).

Environmental permits include all costs related to the process of meeting the legal and regulatory requirements or guidelines for environmental assessment and for obtaining permits (including preproduction permits) required for the work program under consideration.

Environmental protection includes costs for monitoring (additional to normal practices) and complying with laws, regulations and guidelines related to air emissions, liquid effluents, ground pollution, and wildlife and habitat protection. Environmental fines, if any, are included in this category.

Environmental restoration includes all costs of decommissioning, reclaiming and restoring, and monitoring, if required, after the completion of exploration and deposit appraisal field work.

Land Access-Related Expenditures

Land access requirements, permits and damages include all costs related to establishing impact and benefits agreements, socio-economic agreements, and other requirements for mine complex development and mine production, and the costs of rights of way, damages and permits for exploration and deposit appraisal work, including all associated legal fees, but excluding all environment-related costs.

Capital, Repair and Maintenance Expenditures

Capital expenditures for construction, machinery and equipment include expenditures by the company for work performed by contractors or by the company for its own account, such as salaries and wages, materials and supplies, and other charges such as engineering and consulting fees. Environment-related capital expenditures for protection and site restoration are included in this category.

Non-capitalized *repair and maintenance expenditures* consist of the gross non-capitalized repair expenditures on non-residential buildings, other structures and machinery, the costs of maintaining the restored mine site, and the routine care of assets, including environmental monitoring of the restored mine site.